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CHILD DEVELOPMENT

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CHILDREN'S ART ABILITIES: STUDIES AT THE CLEVELAND MUSEUM OF ART

Thomas Munro, Betty Lark-Horovitz, and Edward N. Barnhart
Department of Education, The Cleveland Museum of Art

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I. INTRODUCTION

Thomas Munro

A. The Educational Background of the Studies

The following article attempts to summarize and combine the results of a project of research and experimental education which was carried on at The Cleveland Museum of Art between 1935 and 1940, with the aid of a grant from the General Education Board of New York. In this introduction, I shall mention first some of the reasons why the project seemed useful and timely from the standpoint of the current educational situation.

It is well known that recent education in America has accorded greater recognition to the importance of art, including the visual arts, as a desirable element in the student's experience on all age levels. It has tended also to stress the importance of creative expression in the arts; of productive activity, initiative and originality on the part of stu-

dents, rather than mere imitation or memorized learning. It has stressed the desirability of using the hands and acquiring some skill in the technical manipulation of art materials —this not only for the prospective artist or craftsman, but for all students, as a part of their general education. While most students can go only a short way toward acquiring technical skill along any one line, it is felt that each should have a chance to experiment early in life with a variety of materials and media, out of which he may select a few for continued study. Even though he later abandons most or all of them as fields for productive effort, he should continue to enlarge his appreciation of the arts, as an intelligent layman. He may even decide to continue some as leisure avocations; and in any case the productive experience will have been worth while in itself, as well as a contribution to his mental, perceptual, and muscular development.

In recent years, economic depression and the war have seriously hampered the realization of this desire to increase the emphasis on art and other so-called 'cultural' elements in education. But many teachers and institutions have struggled persistently against the trend toward narrowly practical studies for younger and younger students. They have tried to think out, in teaching methods and curriculum planning, some of the problems which will inevitably become more pressing and widespread, when world conditions again permit return to the task of organizing education along liberal, cultural lines.

One such problem is that of selecting leaders in and through the educational process; an urgent problem in a large democracy, where mass production, standardization, and leveling constantly threaten to dominate. It is encountered in art as in other fields, wherever high grades and promotions, awards and scholarship aids are to be administered. Democracy calls for the giving out of such inducements to the genuinely deserving, the potential leaders, from whatever economic, geographic, or racial group they may come.

But how can we discover the really talented, promising students in art; if possible at an early age? In most other subjects, ability is more easily recognizable, and to some extent measurable, especially when it can be manifested through correct inference or fact-finding, or (as in engineering) by tasks in which the standards of successful performance are clear and accepted. The standards of successful performance and creation in visual art are still obscured by wide disagreement among artists and critics. The standards of mature artistic value being themselves highly debatable, how can we measure the creative or appreciative performance of children?

To be sure, several alleged tests and measures of art ability in production and judgment have been available for several years; but none has been accorded general acceptance by artists or educators. For a variety of reasons, of which space forbids repetition here,[1] those responsible for the research herein described agreed with the prevailing scepticism toward them. Still, the idea remained tempting, of a test or scale on the order of the Binet and later tests of intelligence, aptitude, or probable learning rate, which would deal with ability in the visual arts. Combined with tests of musical and other types of art ability, it might even yield a measure of *aesthetic age*, comparable to 'mental age', and a numerical quotient in relation to chronological age.

Let it be said very definitely here at the start, that no such goal was attained by the Cleveland studies, or even sought as a practicable end in view. The resources of the program were far too limited, and the theoretical difficulties too clearly recognized. Whether a few groping steps in that direction were made, it is for the reader to decide. But at least it can be claimed that all the workers were clearly aware of the paramount danger in constructing an art ability test, and studious in trying to avoid it: namely, the danger of assuming in advance that one knows what good art is (or asking a group of supposed experts who claim to know), and then measuring students' ability in terms of approximation to that supposed norm.

Yet, while the difficulties in the way of a standardized test were obvious, another fact was equally so. Art education as an actual process made some sort of evaluation necessary. Some had to be done and was being done in thousands of schools, in order that the machinery of promotion and graduation, prize-giving and job-giving might go on. At this end, one might say, "the subjective judgment" of teachers held sway; a process of arbitrary grading with undefined or vaguely

[1] *Cf.* Munro, T., "Art Tests and Research in Art Education," *Bulletin of the Western Arts Association*, XVII:6, December, 1933.

defined, unsupported standards. At the other end lay the unattainable vision of a purely objective, scientific instrument for exact evaluation of work and measurement of ability. Was not an intermediate, transitional stage possible—some procedure a little more systematic than the ordinary ones, more clearly thought out in its criteria, more informed about the facts of art and of child development, more intelligent in its adaptation to new educational objectives? Would not this be of value to teachers, even though no claim were made to have jumped at one bound to the heights of scientific precision?

In 1934, the Progressive Education Association and the General Education Board, in cooperation with a selected group of secondary schools and colleges, were pursuing an extensive program of research on adolescence, and on the agencies and branches of education on the secondary level.[2] It was felt by many educators that this level had lagged somewhat behind the lower ones in adapting its methods and content to the psychological needs of students. The growing influence on youth of radio, periodicals, screen and stage was being discussed; and that of the art museum as an educational agency. Teachers were asking, for example, how museum visits and loan exhibits could be most profitably fitted into school work in art and other subjects; whether, for example, the study of old masters in art could be made conducive to original creativeness, rather than to imitation. A museum which had some contact with students of secondary age thus seemed to the General Education Board as one promising place to study the evaluation of art ability and performance. The secondary level was to be emphasized, but not exclusively, since it might be illuminated by comparison with the earlier ones. The inquiry was not limited to any single problem, such as testing, but was open to any way of throwing light on children's art and art abilities.

B. Conditions Under Which the Studies Were Conducted

At no single place, or type of institution, can all aspects of children's art be effectively observed; different ones have peculiar advantages and disadvantages. An art museum has some of each which the ordinary school does not possess.

The Cleveland Museum of Art was considered especially favorable as a place for study, because of the unusual extent to which it had emphasized and developed educational work with children. Under its two directors, Frederick A. Whiting and later William M. Milliken, children unaccompanied by adults had been given free access to all galleries, with permission to draw and free drawing materials. In well lighted studios, watercolor, ink, and modeling clay could be used. Thousands of students, from nursery school through university and art academy, flocked to its classes. School teachers brought their own classes during the week, to derive illustrative material for their work in art, history, and many other subjects. On Saturdays several hundred children came to draw, paint, model, listen to music and stories, hear illustrated talks, and watch plays, moving pictures and marionette shows. Some of them attended special classes for children of members; others attended open classes, free to all, and still others attended free classes for those believed to have special talent in art. The racial backgrounds of the children were extremely diverse. For all, cultural development rather than professional training was the principal aim. Classes were graded according to age level, and met on successive Saturdays in various parts of the museum, so as to permit a varied round of activities. In many of them, an attempt was made to interrelate work in visual arts with that in music; and in all, to combine appreciation with creative production. Exact, unimaginative copying from nature or from other works of art was not encouraged, but students could use museum objects as materials and suggestions for adaptive modification. It was not assumed that such an approach to art was necessarily better than completely "free expression", apart from other art; but it was felt that such an approach was the peculiar opportunity of the art museum for experiment, with its wealth of art objects beyond the reach of most schools.[3]

On the other hand, the museum was comparatively limited in its contact with individual students. A child came, perhaps, each Saturday morning for a season of twenty-five weeks. (Some attended a year-round class

[2] Their principal study of secondary school art was published by the Committee on the Function of Art in General Education for the Commission on Secondary School Curriculum, under the title, *The Visual Arts in General Education*. Appleton–Century, New York, 1940.

[3] For details of the educational program, see Munro, T., "A Graded Program in Comparative Arts," in *Art Education Today*, Teachers College, New York, 1936.

which met outdoors in summer.) Those who came during the school week, with outside teachers, could receive little individual attention during their short gallery visits. Attendance was voluntary at the Saturday classes, except insofar as parents exerted mild pressure. A considerable number of children came year after year, but others drifted in and out, "shopping around" among the city's varied week-end activities. Thus there was a fairly large annual turnover, and new students were constantly entering the upper age levels without any previous museum instruction. An easy play spirit had to be maintained, for its own sake and to hold attendance; anything like sustained, enforced hard work ran the risk of making students leave entirely. This militated somewhat against the giving of frequent, formal tests. Although the psychological staff contrived ingeniously to make them short and pleasant, weaving them into the regular art lesson, and although the teachers and students cooperated surprisingly well, nevertheless the fear of imposing too much on the all-too-brief time for regular work restrained the psychologists from pursuing many experiments up to a theoretically adequate stage. Moreover, age level groups in the Saturday classes were not evenly distributed, or all large enough to provide sufficient data. The peak load was around eleven years old, although classes extended from six to sixteen; older students, especially boys, were much less numerous.

Another advantage at the Cleveland Museum was the fact that examples of children's drawing had been carefully preserved there over a period of twenty years. Since the museum's founding in 1916, its Associate Curator of Education, Mrs. Louise M. Dunn, had filed examples considered outstandingly good, average, and outstandingly bad, with supplementary data on the artists. The development of several individual students was thus illustrated from childhood to maturity. Some of these, after going through art school, had become successful professional artists, teachers, and writers.

Out of the need to choose students for the "Special", or Advanced Drawing Class for talented children, came the recognition of a problem: could this choice be made more scientifically? It had been made rather informally for years, on the basis of interest shown through coming to the museum and drawing, or through recommendations of school teachers. Each fall for years, such recommended children came for an entrance test, which consisted in making several drawings. Mrs. Dunn and other museum teachers picked out the drawings and the children they considered most promising, but wished to improve this arbitrary process if possible. Also, they wished to learn more about children's development in art—its natural course in normal and supernormal cases, and the best ways of enriching it educationally.

As it happened, a neighboring institution (the Brush Foundation, connected with Western Reserve University) was in 1935 conducting studies of children's physical and emotional development, under a distinguished scientist, the late Dr. T. Wingate Todd. His associate, Dr. Dewey Anderson, was giving psychological tests to the same selected children over a period of years. It seemed an opportune time to conduct parallel or interlocking observations of children's aesthetic and artistic development. The General Education Board, which was financing some of Dr. Todd's work, agreed to support the museum's project also; and with Dr. Todd's advice the two projects went on for a time in close touch with each other. It proved impossible, however, to make them overlap thoroughly by using the same children as subjects; and after Dr. Todd's death and Dr. Anderson's departure, the researches followed different lines.[4]

The Cleveland Museum of Art was and is not primarily a research institution. It lacked staff and equipment for conducting psychological experiments. Through the grant, these were gradually secured in modest proportions; but it proved surprisingly difficult to secure properly qualified workers, with some training in art as well as in psychology, especially on the short-time tenure necessitated by terms of the grant. Workers came and went, and the work lacked continuity.

C. Progress of the Studies

One of the first steps, in 1935, was to secure the cooperation of the Cleveland Board of Education, so that tests might be given to school children. Miss Frieda Hutchison, psychologist for the Board, was granted leave of absence to join the museum staff. With her

[4] Results of Dr. Anderson's psychological studies at the Brush Foundation have not been published.

assistance various art tests were given to hundreds of school children. Supplementary data cards were filled out for as many of these children as possible, with facts as to school I.Q. and other tests, school record, home environment, etc. All existing devices[5] for testing art ability in production or appreciation were studied and discussed; and several were given to museum classes for comparative purposes. In the fall of 1935, Miss Carolyn Tiebout was asked to join the staff because of her experience in experimental studies of children's art under Norman C. Meier in Iowa. Later on, she and Miss Hutchison left for other work, and the detailed management of the project was given over in 1936 to Mrs. Betty Lark-Horovitz, who had had experience in both art instruction and psychological research on children's art in the Vienna schools. Mrs. Esther M. Sills (then of Ohio State University) joined the staff in March, 1937, as research and teaching assistant, and Dr. Edward N. Barnhart of the University of California[6] came in September, 1937, as research associate. Mrs. Lark-Horovitz remained after all these others had left, to work on the present report with the aid of Miss Elizabeth Harding. Valuable help was given throughout the project by many teachers not directly employed on it: notably Mrs. Katharine Wicks, Mr. Milton S. Fox, Mrs. Viola Wike and Mrs. Lois Wellman of the museum staff; Mr. Alfred Howell, Director of Art in the Cleveland Public Schools; Mr. Otto Ege of the Cleveland School of Art; Misses Mabel Ely and Jean Corser of the Shaker Heights Public Schools.

D. The Seven Drawing Test

This test was an outgrowth of the regular museum entrance test for the advanced drawing classes. It consisted of seven drawings to be made by the child on different subjects, and was designed to bring out different types of drawing ability—for example, to draw from memory, from imagination, from another picture on view, and from a moving, changing object. One was to show some of the child's interests by allowing him freedom to choose a favorite subject. This test was first given by Mrs. Dunn and the author in September, 1933. The children were seated in the museum auditorium, with empty seats between them. They were given identical sets of material: a piece of drawing board, a box of colored pencils, and a pamphlet of blank sheets of drawing paper, each set being serially numbered and each sheet numbered from one to eight. On the back of the last sheet was printed the following questionnaire, to be filled out:

1. Name
2. Address
3. How old are you? ____ Date of birth (year) ___ (month) ___ (day) ___
4. School _____ Grade _____
5. Where were you born?
6. Where was your father born?
7. Your father's occupation _____ When employed _____
8. Where was your mother born?
9. Are you left-handed?
10. Who has encouraged you to draw or study art?

Standardized instructions were read by the examiner, as follows:

Preliminary Instructions; repeat as much as necessary:

1. "Do not mark on these sheets until you are told to do so."
2. "Has everyone a folder of papers, a cardboard and a box of colored pencils? If not, raise your hand."
3. "Lay your folder on the cardboard so that the blank page with numbers is on top."
4. "Be careful not to look at anyone else's paper."
5. "Don't use any pencils except the ones you were given."

Questions:

1. *Favorite Subject* (time, ten minutes). "Answer the first question on page one. You can use as much of the page as you like. This is the first question. Make a drawing of whatever you like best to draw. It can be a picture of anything at all. Make a picture of whatever you like best to draw. The time allowed is ten minutes. Begin now." . . . "You have one more minute to finish this question."

2. *Drawing of a Man* (time, five minutes). "Now turn to page 2. *On this page draw a picture of a man. It does not matter what kind of man you draw, what he is doing, or how he is dressed." (Repeat from asterisk.) "You will have five minutes. Now begin."

[5] Cf. Kinter, M., and Achilles, P. S., *The Measurement of Artistic Abilities*, The Psychological Corporation, New York, 1933.

[6] Joint author with A. R. Chandler of *A Bibliography of Psychological and Experimental Aesthetics*, Berkeley, California, 1938.

. . . "You have one more minute to finish this question."

3. *Memory* (time, twenty minutes). "Now turn to page 3. Shut your eyes a minute. Try to remember how your classroom looks at school. (Short pause.) Now open your eyes. Make a picture showing just how your classroom looks while the children and the teacher are there. Make a picture showing just how your classroom looks while the children and teacher are there. You have twenty minutes for this question. Now begin." . . . "You have one more minute to finish this question."

4. *Imagination* (time, twenty minutes). "Now turn to page four. On this page make a picture showing what you would like to do next summer. Shut your eyes again for just a minute. Try to imagine something you would very much like to be doing on your next summer vacation. Now open your eyes and draw." . . . "You have one more minute to finish this question."

5. *Decorative Design* (time, fifteen minutes). "Now turn to page 5. *On this page draw a design which could be used for a rug. Make a picture of the most beautiful rug you can imagine." (Repeat from asterisk.) "The time allowed is fifteen minutes. Begin now." . . . "You have one more minute to finish this question."

6. *Copy of Lantern Slide of a Painting* (time, ten minutes). "Turn to page 6. In just a minute you will see a picture on the screen." (Dim lights and show picture of Chardin *Still Life*.) "Now, while this picture is on the screen, make a copy of it on your paper. Make just as exact a copy as you can. The time allowed is ten minutes. Now begin." . . . "One more minute."

7. *Drawing from Moving Picture* (time, ten minutes). (While lights are on.) "Now turn to page 7. In just a moment you will see a very short moving picture of an animal in motion. This moving picture will be shown several times. While it is being shown, make a drawing of the animal which you see. Make it in any position you like. If you wish to make more than one drawing on this page you may do so. The time allowed is ten minutes. Now begin." . . . "One more minute."

This test was given to over thirteen hundred children: in elementary, junior and senior high schools, under conditions closely approximating those in the museum auditorium; to all the museum Saturday morning classes at least once, and to a selected group of the "Specials" or advanced students, again after two years. It was given in 1936 and 1938 to additional children, in order to secure the necessary minimum for sexes and age levels. It yielded a vast mass of data in the shape of over nine thousand drawings, plus supplementary information about the young artists. To analyze the data from this one test with real thoroughness would have consumed the time of a much larger staff for a much longer period. A great deal of it still remains on file in the museum, along with other children's art, to await the time when studies may be resumed. A large part of Mrs. Lark-Horovitz's report, in the present article, deals with generalizations gleaned from this source of material. It consumed a considerable share of the staff's time and energy throughout the research, although each new test likewise yielded masses of children's art —easy to get, but hard and slow to interpret.

As a testing device, the Seven Drawing Test (given before the research began) was never regarded as a perfected instrument, worthy of being given out for general use. It immediately disclosed several faults, especially the following. (1) In drawing a man (question 2) children should have been told to draw the whole man; many drew the head only. (2) The moving picture used for drawing 7, of a horse in motion, had been too inferior in quality, too blurred and rapid, for many children to grasp it; yet to change the film would make comparison impossible. (3) The lantern slide of drawing 6 was in black and white, unsuited to the colored pencils and too complex in line and texture for young children to copy. Dimming lights to see the slide made it hard for them to draw. (4) The instructions for drawing 5 were so phrased that some children tried to draw an actual rug in perspective, missing the point of the question, which was to elicit an abstract, decorative design.

E. Other Experimental Devices

More fundamentally, it was realized that no single test, no set of drawings made on a single occasion, could give more than presumptive evidence of a child's probable success in art. Too many important psychological factors, such as motivation, work habits, and emotional stability, would not appear to any considerable extent in the results. For

these, observation over a period of time would still be necessary.

The Seven Drawing Test was obviously faulty, but at least it had brought out a wealth of promising data. The staff questioned whether to lay it aside and work out other tests, in the hope of perfecting some of them, or to neglect the invention of new tests, but study the results of the faulty one as carefully as time allowed. Actually, they took a middle course, trying out several new devices, but not attempting to perfect any one of them. They hoped to build up a series, not of formal tests, but of devices for observing and experimenting on children's production and appreciation of art. These could be partly standardized into definite tasks to be performed at various times, under controlled, uniform conditions. They were aimed at stimulating significant responses from the child, which an intelligent teacher might find enlightening, even though not exactly measurable. Any teacher or examiner was free to vary these devices, and it was hoped that exchange of results would gradually improve and develop them.

Several such devices (all simpler than the Seven Drawing Test) were carried to various degrees of completeness, and tried out in museum classes. They are described individually in the articles by Mrs. Lark-Horovitz and Dr. Barnhart which are listed and summarized in the present report. The principal ones are as follows:

1. *The Seven Drawing Test.*

2. The *Beautiful Page* experiment: an attempted improvement on question 5 of the Seven-Drawing Test, in that it calls for abstract decoration rather than a picture of a textile. The child is simply told to make the sheet of paper as beautiful as possible, and that it need not look like anything else.

3. The *Story Completion* experiment: an attempt to stimulate imagination by telling part of a story, then having the subject complete it (a) in pictures; (b) in words. (This allows comparison of pictorial with literary ability.) A fairy tale and a fictitious news item, both with vivid imagery, were used.

4. The *Recorder:* a device for preserving a record of consecutive stages in the development of a child's drawing; showing to what extent and how he plans it systematically, rather than adding details at random. The child draws on a sheet of paper, under which are carbon paper and a roll of white paper which can be shifted at intervals by the examiner.

5. The *Machinery Drawing* experiment: a way of studying children's ability to learn and change their own ways of drawing as a result of observing pictures by others. (This is specially relevant to museum instruction, where children are led to appreciate art of all periods, and then asked to make works of art of their own, which will profit by that appreciation and yet avoid direct copying.) The group is first asked to draw a picture involving machinery of some kind; is then shown museum pictures involving machinery; and is finally (at once or on another day) asked again to draw machinery pictures, without having the museum examples to look at.

6. The *Bear* or *Visual Memory* experiment: a way of studying children's ability to remember and represent an object seen, after various intervals of time. A ceramic figure of a bear is shown from different points of view, then withdrawn. The children are asked to draw it immediately, then after several days and weeks.

7. The *Art Appreciation* experiments. In addition to the above ways of studying drawing ability, methods were developed for observing and comparing children's preferences for different types of art. Selected, diversified sets of pictures, textiles, ceramics, and other objects were shown to them with specified comments and questions; their answers were noted down, analyzed, and classified. The aim was not to decide or measure how "correct" their judgments were, but to find out how different types (as to age, sex, etc.) differed in their attitudes toward art.

8. The *Project Analysis Record Sheets* for use in school or elsewhere; some for students and some for teachers, as means of systematizing evaluation and records of progress toward chosen objectives. They are, in a broad sense, devices for observation, experiment, and evaluation.

These eight types of instrument (each of them capable of much variation and development) were all aimed at eliciting samples of constructive work or aesthetic response on the part of the student, or at recording and appraising extended programs of work. In addition, the task of interpreting results of the Seven Drawing Test required certain instruments of a different sort.

F. Evaluation in Practice

Three kinds of problem confronted the staff. One, when the test was first given in September, 1933, was immediately practical. In a few days, before classes started, about fifty students had to be selected for the Museum Special Class of supposedly talented children, eleven through sixteen years of age. The selection was to be made in large part from the drawings of about two hundred children who had applied for admission. There was no time for detailed analysis or theoretical quibbles; decisions had to be quick and arbitrary.

Accordingly, three judges of reputation and experience with children's art were asked to make them. The papers were first divided into piles according to age levels. Beginning with the youngest, paper after paper was inspected by the three judges at once, and assigned by them to an A, B, or C group (good, medium, bad) within the age level. Thus, each age level pile was divided into three. There was usually swift agreement on the verdicts; a few were discussed at some length, or held in suspense until the rest had been judged and the degrees of relative merit seemed clearer. No one simple standard was used; the judges often remarked of a "C" paper that it was "weak", "fumbling", "stereotyped", or "had nothing to say"; of an "A" paper that it had "life", "vitality", "sense of humor", "distinctive point of view", or "decorative quality", "rhythmic lines" or "delicate textures". Fifty best were chosen from all the "A" piles, with approximately equal distribution. As a safeguard, any applicant not chosen for the "Special" class was allowed to enter an "Open" class, with no restrictions. There he was observed for months, and in some cases advanced to the Special class afterward; while some who had been chosen for the latter proved unworthy in the long run. Such a process of choice could certainly be called arbitrary and subjective, strictly speaking. But at least it involved explicit discussion of standards, a tentative attitude, and systematic comparison of the data.

G. The Analysis of Children's Drawings; a Manual for Teachers

A second type of problem was to make the Seven Drawing Test, or some altered version of it, into a more workable tool of evaluation for the outside teacher. Ideally, it should be not only capable of yielding exact numerical scores, but also somewhat mechanical and automatic in operation; so that the ordinary teacher, not an art expert, could use it. These results might have been attained through the usual process of "validation"—submitting the papers to many judges, or repeatedly to the same judges, giving the test repeatedly to the same children, and preserving only those features in test and scoring which seemed most "reliable"—that is, which would yield similar results on repeated use. But the staff were convinced that such a test would be specious, merely one more neatly printed device for enforcing established, conservative standards, for glorifying conventional types of "good art", while missing or disparaging the unusual and experimental. At the same time, while avoiding excessive claims to accuracy, the test might perhaps be sharpened up a little for general use.

As a means to that end, the staff worked out what Mrs. Lark-Horovitz calls the *Analysis* (in her section of this report), and a somewhat different version which was published by the Cleveland Museum of Art in 1939 under the title *Graphic Work-sample Diagnosis: an Analytic Method of Estimating Children's Drawing Ability*, by B. Lark-Horovitz, E. N. Barnhart, and E. M. Sills. This mimeographed volume of 143 pages, plus appended "check sheets", contains a manual of instructions for teachers to use in checking and diagnosing children's drawings, preceded by an introductory explanation of the various types of children's drawing by age levels. It is illustrated with black and colored photographic reproductions and line drawings of various types. It amounts essentially to a scale of graded examples, with verbal comments to point out their distinctive traits, by comparison with which the teacher may grade the work of her own pupils. It was worked out through a study of the Seven Drawing Test papers, with examples taken from them. Hence its proposed age-level norms are applicable, in a strict sense, only to drawings made under the same conditions (as to subject, medium, time allowed, etc.) However, its illustration and definition of types of children's drawing, and of specific traits therein, may be found more widely useful. This book was sent out to a number of teachers in schools cooperating with the adolescence research of the General Education Board, some

of whom used the manual and reported to the staff on their results. Certain drawings were sent around to be analyzed and graded by different teachers, with the use of the *Diagnosis*.

As an educational instrument, it proved too difficult and time-consuming to be popular for systematic use, although it was praised as an "eye-opener" in the teaching of art. Most teachers are not at present sufficiently interested in the careful grading of students' drawings to be willing to take the time necessary for it. To distinguish types of art requires specific training, as it does to distinguish botanical or zoological types. Few classroom teachers and not all art teachers have had it. No doubt the process can be simplified further than in the *Diagnosis;* but it cannot be made entirely quick, easy, and automatic without dangerous over-simplification. There are too many kinds of good art, by children as well as by adults; too many important individual differences; too many detailed characteristics worthy of note, for any simple scale of examples to cover them adequately.

The idea of a manual for use in grading pictures runs up against serious difficulties. One is that of nomenclature and definition of terms, in referring to type of art and elements in art. Aesthetic theory is still in a very primitive state on this matter; there is little or no accepted terminology for the description of adult art, of the masterpieces of art history. There is no recognized technique for analyzing and comparing works of art. If there were, it might be applied with modification to children's art. But whenever we try to analyze a child's drawing in such terms as "design", "realism", "unity", "rhythm", "balance", "proportion", etc., we discover radical differences among teachers and critics as to what these terms mean and what aesthetic values are to be attached to them. At least, the staff did try for some clarity and consistency by stating definitions for the principal terms. But outside teachers often could not understand or accept them, and applied the same term to a given example in widely varying ways. It is too much to hope that any single educational device can produce at a single step a generally acceptable technique and terminology for art analysis. That is a long job for aesthetic theory, which must be approached through study of old masters as well as of children's art. A good start was made toward it in Germany and Austria during the twenties; but it has had little effect on American education.

Well aware of this problem, the staff approached the task of analyzing the Seven Drawing papers in a careful, indirect way. They had first to work out a definite method of analysis. This was done in the form, first, of a questionnaire or list of characteristics believed to be somehow significant in children's art, for the analyst to notice in the case of each picture.[7] In conference, the questionnaire was revised several times, and became the list of characteristics which are defined and illustrated in the *Diagnosis*.* Fair agreement was secured on the meaning of terms, but to the end even close co-workers understood and applied some of them differently.

On the basis of the questionnaire, a number of large blank charts were made: several for each of the first four drawings of the test, as executed by boys, girls, and various age level groups. Large, representative samplings of the test papers were taken, mostly from the Seven Drawing Test, plus some from the "Beautiful Page" and other experiments. These were analyzed in minute detail, the results being entered and tabulated on the charts. This was the slow, drudging, time-consuming phase of the process, common to all inductive science.

The questionnaire, the charts and the tabulation had one primary aim: to show the age-level and sex distribution of specific characteristics in children's drawings. By this means, it was hoped, we could begin to generalize in terms of developmental norms. These would doubtless not be capable of exact numerical statement; but would consist of verbal description, illustrated by typical examples, of the kinds of drawing usual on each age level. There would be a range of variation on each level; certain characteristics being nonexistent among younger children, then becoming gradually more prevalent; others perhaps gradually dying out with maturation. With such an account of normal development, the teacher could compare the work of any particular child, and find out to what extent it was normal, advanced, or retarded, both on the whole and in specific ways. The *Diagnosis* provided such an ac-

[7] Compare the "Questionnaire for Picture-analysis" in *Great Pictures of Europe*, by the author. (Brentano, New York, 1930, pp. xxii–xxxii.)

* See Appendix I.

count, replete with illustrative detail, and as such provides a suggestive (though not an accurate) instrument for any teacher who wishes to take the trouble to use it. Its indications will be useful in proportion as the teacher takes care to set up the same conditions as those used in determining the norms.

Substantial aid was provided for this phase of the work by previous European studies of children's drawing.[8] Psychologists had distinguished roughly between the so-called *schematic* or conceptual and the *true-to-appearance* or visually realistic stages. Historians and anthropologists had gone on to point out resemblances between children's art and primitive art, and some had even suggested that children's artistic development involved a recapitulation of some of the main stages in art history, from crude schematism to the developed realism of the Renaissance, with its three-dimensional modeling and perspective. On the other hand, it had been pointed out that some very primitive art—that of the Ice-Age cavemen—was not schematic but realistic in outline.[9] Leaving aside controversial issues in psychology and cultural history, there remained a thoroughly documented, skeleton outline of the normal development of children's drawing ability, which apparently held true of children the world over.

This important conception of artistic development in the individual had never been subjected to verification in America, on a scale comparable to that of the Cleveland studies. It is one accomplishment of these studies, as expressed in the *Diagnosis* and in Mrs. Lark-Horovitz's section of this report, to have confirmed, refined, and considerably developed this conception. As the report will go on to show, it can be subdivided into intermediate stages, as follows: (1) the primitive schematic stage; (2) the full or developed schematic stage; (3) the mixed stage (intermediate between schematic and true-to-appearance); (4) the true-to-appearance; (5) the perspective stage.[10]

Not all individuals, even modern adults, pass through all these stages. Many of them remain on a schematic and therefore childlike or primitive stage as regards drawing ability, or regress to one through disuse, although highly educated along other lines, and perhaps highly capable of appreciating art. But the evidence indicates that no individual can advance to a later stage without going through the earlier ones, in substantially the order named.

Development from stage to stage is apparently not dependent on specific training in art, though probably capable of being affected and somewhat accelerated by it. (Experimental data is lacking on this point.) It apparently tends to go on to some extent with little or no art instruction, and whatever teaching methods are used, as a result of general mental and perceptual development, muscular coordination and observation of popular art.[11] In estimating a child's artistic development, then, we are studying not only his specific achievement or acquired skill in art, but also certain indications of his general mental development.

H. Maturity, Realism, and Excellence

Can degree of advancement in realism be taken as equivalent to degree of excellence in a picture, and of superior talent in a child? Is a more mature or precocious child or picture necessarily better? These questions recall the old controversies over whether evolution is the same as progress; whether increasing complexity of structure and of civilization are necessarily improvement, or whether (as Rousseau argued) more simple and primitive stages are sometimes better. In many cases no dispute arises: the more mature child and picture seem possessed of all the other possible artistic virtues, and so are unhesitatingly put down as "superior talent". Insofar as this is true, one can use the scale of development as a scale of excellence; that is, as an objective indicator or correlative of

[8] The most important of these, available in English translation, are Helga Eng's *The Psychology of Children's Drawings*. (Harcourt, Brace, N.Y., 1931) and K. Bühler's *The Mental Development of the Child* (Harcourt, Brace, N.Y., 1930).

[9] For further discussion of this subject, with bibliography, see "The Psychological Approach to Art and Art Education", by Thomas Munro, in *Art in American Life and Education*, 1941 Yearbook of the National Society for the Study of Education, especially pp. 273–288, on "Aesthetic Development, Individual and Social" and "The Evaluation of Children's Work in Art". Also, in the same book, Ch. XXII, on "Creative Ability in Art and its Educational Fostering". (Public School Publishing Company, Bloomington, Illinois.)

[10] These names are capable of further improvement. The fourth is "true-to-appearance" only in a limited sense, especially as to linear outline and modeling and texture. Full visual realism comes only with perspective and deep space representation, if then.

[11] Cf. Lark-Horovitz, B., "Interlinkage of Sensory Memories in Relation to Training in Drawing." Journal of Genetic Psychology, 1936, 49, 69–89.

excellence, even though the two are not synonymous. But it is not always or necessarily true. A highly realistic work may be found in some ways mediocre; a schematic one may be admired for its decorative or expressive qualities.

In art criticism generally, extreme realism is not considered equivalent to excellence, or a necessary sign of greatness. Art history has not stopped short with the realistic modeling and perspective of the Renaissance. It has gone on to modern eclecticism, with its frequent conscious reversion to the decorative distortions and schematism of primitives and children; with deliberate sacrifice of realism to design, expression, and fantasy. Often in the past, sophisticated adult artists have made the same sacrifice, consciously or not —for example, in Byzantine mosaics and Persian miniatures. They have managed to find great scope for development on a level which our scale of stages would describe as relatively childish.

To decide artistic standards, and define excellence in general, is a problem essentially outside the field of the psychologist, and of all descriptive science. It involves aesthetic and perhaps moral standards, as well as questions of general mental and physical health. But the psychologist can at least analyze its detailed implications. Is degree of maturation regarded as equivalent to excellence in other phases of child development? Certainly we do not always consider precocity a desirable trait in children—for example, in matters of sex. On the other hand, the question does not seem to arise in regard to intelligence tests, where a more mature status is an accepted sign of superiority. Of course, it is open to any school or teacher to adopt as an objective the development of adult ways of drawing. As a matter of fact, this was the main objective in teaching drawing until the time of "free expression" and "progressive methods", with their implication that children's ways of drawing had values of their own, and were not mere crude approaches to adult art. The vast majority of people, art teachers included, still think of art value largely in terms of successful realism. If any judge or teacher still wishes to adopt the scale of normal development in drawing as equivalent to a scale of improvement, of increasing ability in general, then the *Diagnosis* will help him evaluate much more precisely and systematically than before.

However, the progressive art teacher, like the "advance guard" artist and critic, will not be satisfied with evaluating children's art entirely on a basis of increasing powers of realistic representation. He will insist, as did the judges above referred to, who quickly appraised results of the Seven Drawing Test, that one six-year-old drawing can be better than another, even though both are definitely schematic in type, and show no signs of advancement to the next stage. Within each developmental type, in other words, there is room for considerable variation in detail, in mode of treatment, which many judges will regard as sufficient to determine a picture's merit. Such characteristics may even outweigh, in the judge's mind, degree of realistic advancement. He may admire a child's drawing as he does an African Negro carving; not with a condescending smile as if to say, "Pretty good for one so young; or for a mere savage"; but on its own merits as superior to the average adult, modern academic piece. Often it is the decorative, design aspect of the childlike or primitive piece; an aspect often weak or missing in the academic. Often (as remarked above) the judges were attracted by an effect of vitality, humor, or a vividly childish way of looking at the world and picking out what seemed important to the childish mind—a net effect of artistry through definite selection, emphasis, and reorganization from direct experience. It seems to manifest itself on any age level beyond early infancy, and not necessarily in proportion to maturity or amount of skill and information. In fact, too often it seems to decline as these increase.

Can these intangible, supposed signs of excellence be described in any objective way? The Cleveland studies have made only a slight beginning; not enough to provide anything like a definite scale or manual. They have called attention to the problem, at least; and have gone a step farther in roughly distinguishing between what Mrs. Lark-Horovitz calls "developmental", "constant", and "rare" characteristics. In the last two of these categories, perhaps, remain hidden the elusive intangibles which future workers will regard as signs of superior ability regardless of age level. A "developmental" characteristic, in Mrs. Lark-Horovitz's meaning, is one which

changes according to age level. A "constant" characteristic appears with considerable frequency, in about the same degree in all age levels. A "rare" one appears very seldom on any level. "True to appearance" is a developmental characteristic; "smooth areas" is a constant one; and "bold line" is rare. Such classification of specific characteristics was made on the basis of fewer examples than could be wished, especially on the higher age levels, and it is hoped that future study will revise and clarify them considerably. As matters now stand, our understanding of rare and constant characteristics is still vague and fragmentary. It has been hard to describe them without the use of evaluative, non-objective terms. Our conception of their importance in relation to giftedness is subject to change in the light of new aesthetic theories.

The term "developmental", as used here, includes characteristics which tend to dwindle and die out with maturation, as well as those which grow. Both, it is felt, are somehow bound up with development in general. One of the most interesting disclosures of the Seven-Drawing study is the way in which decorative characteristics in general, especially in use of bright colors and rhythmic lines, tend to die out as the child grows older. In the art appreciation study, also, these characteristics gradually lose appeal as reasons for liking a picture. The tendency in both cases is more rapid and pronounced in boys. More and more, with advancing age, the sensuous delight in color, line and pattern for their own sake is sacrificed to the dominating interest in representing certain types of subject-matter, and in doing so with utmost realistic accuracy. The organized grouping of details in a picture also seems to decline in favor of great realism and accuracy in a few details.

Here again, one must notice the apparent recapitulation of certain phases in art history: the dying out of decorative color and line which accompanied the rise of realistic art in the Renaissance. And again one asks, "What next?" If an individual's artistic development goes on, and does not atrophy through disuse in adolescence or b e f o r e, where will it go after achieving full perspective realism? In the case of modern post-impressionists, as we have seen, it can evidently go on to a sort of eclecticism, with possible reversion to certain aspects of the schematic stage; enriched by adult experience, and perhaps combined with realistic features. Our studies up through age sixteen throw no light on this problem. But such considerations do deter us from assuming that our present view of normal development tells the whole story.

Moreover, we may ask, suppose our survey had been made in ancient Persia or Byzantium, or even in modern Paris, would the same decline of decorative emphasis have appeared? Is what we have seen due to the local cultural climate, to America's artistic immaturity or Cleveland's, or to faulty art teaching in schools and museums? Is it due to naive prejudice against decorative art as effeminate? Is it due to some more basic impulse toward realism, bound up perhaps with growing intellectual and scientific p o w e r s, which makes decorative beauty seem trivial and distracting? If so, to what extent should the art teacher try to fight against it, and preserve a taste for design and decoration in the growing child? How can he present the decorative and formal aspects of art in ways more attractive to older children, especially boys?

At the same time, there is food for thought in the experiment by Mrs. Sills (quoted on page 129), which tended to show that preference or liking is not always favorable to active learning. Pictures which the children at first disliked often changed their attitudes more than ones they liked at first sight. Quick liking is sometimes a sign of familiarity; of having learned how to respond to that sort of thing. Dislike, on the other hand, may be due to unfamiliarity. If the first impulse to brush the thing aside can be restrained, and followed up by careful study, the result may be profoundly unsettling and far-reaching educationally. We must not assume that children should be given only types of artistic experience which they accept easily and quickly. How many would go far in mathematics on that basis? We are sometimes justified in persisting for a time against apparent antipathy to a subject on the child's part, if we have good reason to believe he will see its value later. But when possible, it is well to put the dynamic of interest behind his scholastic efforts.

Let us return to the *Diagnosis*. It was evident to the staff that merely grading pictures as more or less advanced or mature in type was not the same as evaluation, and was not

a sufficient way of grading from the teacher's standpoint. To bring it nearer to the teacher's needs, the authors of the *Diagnosis* ventured out a little way from the safe shore of objective analysis, and onto the thin ice of evaluative standards. Among the various characteristics, they labelled certain ones as "desirable" and others as "undesirable". Advanced representational stages were declared to be desirable "because there seems to be a strong inclination for children to strive toward a naturalistic representation of objects and figures. The tendency toward expressionism and abstract art, when it occurs at all, seems to grow out of the true-to-appearance drawing."[12] "Outstanding color", "decisiveness and boldness of line and area", "subtlety of line", "clarity of outline" and "highly organized grouping" were declared to be desirable or superior qualities. On the other hand, "hesitating and weak lines", "ragged, smudgy areas" and "inconsistent use of medium" were called undesirable, signs of inferiority. Evaluative significance was thus given to "developmental" as well as to "rare" and "constant" characteristics. By individual diagnosis blanks, the teacher was aided to analyze a given picture, and to appraise it as "superior", "typical", or "inferior".

Probably no one interested in art criticism can read such a list without at once rising to challenge it with exceptions. Is boldness of outline always good? Do not some great artists use ragged, smudgy areas?—and so on. Endless debate would certainly be possible on these points, for they merely carry over into children's art perennial issues in the aesthetics of drawing and painting. At the same time, there are other considerations to remember. Granting that a certain characteristic may be good when used in a special context by a sophisticated, adult artist, it does not necessarily follow that the same characteristic is a healthy, promising sign in most children's art. On the whole, and except for occasional atypical cases (which the teacher may evaluate as such) we may be justified by experience in regarding it as a sign of weakness. Occasionally, a great artist may affect a smudgy, fumbling, awkward stroke for a certain purpose, long after he has learned to draw firmly and clearly when he wants to. But if a child draws that way consistently, at an age when most children want to draw clearly and have a hard time doing so, the chances are that he is doing so through inability and not intention. No scale can be relied on completely, and the wise teacher will always supplement their use with a careful eye to the rare, atypical genius.

[12] Section IV, p. 35.

Moreover, there is no use trying to evaluate and be purely objective at the same time. The two are essentially inconsistent, and if the teacher wants a method of evaluation, he must be prepared to accept some trace of debatable standards in it. The psychologist renders no great service by remaining impeccably objective (if that were possible) and evading all the practical problems of educational grading. The important questions to raise about a proposed method are: "what standards does it imply or assume? Does it state them explicitly as such, conceding their debatable nature, or does it hide them under a mask of pretended scientific objectivity?" If it does state them, we can go on to debate them, and decide whether or not to accept them. Evaluation becomes more intelligent, not by trying to avoid debatable standards entirely, but by realizing more clearly what its standards imply, abstractly and concretely, and what arguments can be advanced for and against them. We are making a step toward objectivity whenever we define our standards in explicit terms, and analyze vague, general ones into specific characteristics. The importance of such analysis is indicated by Mrs. Lark-Horovitz's study of subjective judgments (page 116), in which it appeared that judges professing similar abstract standards applied them with very different results.

I. Special and Average Groups Compared

Yet another approach to the problem of evaluation has been made throughout the Cleveland studies. It involves detailed comparison between students in the "Special" classes at the museum, made up of supposedly talented, gifted, superior children from eleven through sixteen, and all others. The others included (a) children in the public schools, who had shown no unusual interest in coming to the museum or in taking special art work; (b) students in the museum's Saturday Open class for children, free to all and very diversified as to economic, racial, and educational family backgrounds; (c) students in the Saturday classes for children of museum members, coming from high economic and presumably cultural levels in the community. The

b and *c* groups were not wholly unselected in relation to art, since either they or their parents had shown a definite interest in coming, and perhaps in paying to come; but they had not had to show any special art ability. In fact, any child in the open class who had long shown marked ability was likely to have been transferred from there to the Special class. Choices for the Special class were made either in this way or, as explained above, through the Seven Drawing Test. In either case, admission to it was based on the arbitrary judgment of museum teachers or judges appointed by them.

What right had we then to assume that the "Special" children were actually more gifted than the "Averages", or that any differences between them were associated with differences in art ability? None, theoretically; and all generalizations were made with this clearly in mind. But it is valid scientific procedure to assume something as a working hypothesis, and see where it leads. Also, lacking evidence to the contrary, it is reasonable to believe that supposed experts have some justification for their views; not to accept their judgment as final, but to examine it carefully as a hypothesis. In the same way, the findings of any art test at all, or any mode of judging talent, may be followed out hypothetically, and themselves tested by experience. However implausible or unreasonable it sounds, the results may justify it over a long period of time. Such results—for example, a high percentage of successful careers in advanced art study and professional work—are the only real way of confirming the accuracy of any method for evaluating children's art ability. This way itself can never be final, for all judgments of later "success" in art are debatable, even for centuries after the artist is dead. But it is the only one we have. The chief trouble with most of the current art ability tests is that they conceal their assumptions, and the hypothetical nature of their findings, under a cloak of statistical claims to "validity" and "reliability"—terms which are popularly understood, unfortunately, to mean a great deal more than they imply in a strictly technical sense.

The "Specials", then, were a group of children who had been judged (rightly or wrongly) to possess superior talent. We assumed that they at least deserved special study, and set out to discover in what specific, observable ways (if any) they differed from other children in matters concerned with art. The answers would at least show more clearly what kind of children the judges considered gifted. At most, if the judges were right, we might know a few more observable facts about artistically gifted children. These facts might serve in turn as *indicators* of talent; as signs by which other presumably gifted children could be recognized. By a highly diversified set of tests or experimental devices—some analyzing work-samples, some observing ability to remember visually, to learn a new technique, to defend preferences intelligently, and so on—we might approach the composite of diverse abilities known as "art ability".

Objective differences between the Special and the Average groups were indeed found in a considerable number of experiments. The Specials were on the whole a little but not much more intelligent than the Averages; on the other hand, some high I.Q. groups in the schools did very uneven work in the Seven Drawing Test. The Specials were considerably more advanced in developmental type of drawing than the Averages were. They paid more attention to artistic style, form, mode of treatment, than the Averages did, both in their own productions and in judging other works of art; and were correspondingly less concerned with the nature of the subject represented. They were able to explain and defend their preferences more explicitly, with reference to the artistic qualities of a particular object. They identified themselves less with the subject or scene portrayed, and were more able to take an objective view toward the artist's accomplishments. They observed and learned more quickly, and retained visual memories longer; they were more capable of experimenting with a new medium, and adapting their technique to its requirements.

Whether such differences are really typical of artistically gifted children in general is of course the crucial question. As mentioned above, that cannot be decided with any assurance unless and until we can compare the later artistic performance of the Specials with that of the Averages. More long-term observation of that sort is to be desired. In the meantime, wherever a group of children is selected as gifted in art, by any test or mode of judgment, it is worth while to study them carefully, in order to have the data in hand when their later performance can be appraised.

J. The Meaning of "Development" in Relation to Art Ability

In a recent letter to me, Mrs. Lark-Horovitz summarized her impression of the Museum Specials as follows: "Our findings substantiate the fact that Specials are heightened Averages; that the top-group of Specials represent a still more heightened average (especially as to perception) plus certain intangible qualities—whether inherited or native or acquired—that are, as yet, unexplained. The main difference between the two groups is neither intelligence, nor of a developmental nature. It is the phenomenon that specially gifted children express themselves (and think primarily) in a *visual* medium: that is, they translate all their experience into this mode of expression; while average children lack this ability, even though their experiences are as powerful and their gift of expressing them as strong."

In other words, there appears to be no radical difference in kind between the gifted and the average child in art, but rather a gradual stepping-up of a number of related abilities, plus a strong tendency to experience things visually, and even to try to suggest, represent and symbolize other types of experience in visual terms. This itself might perhaps be called an ability—to interpret the world in visual images—but it also involves a direction of interest and motivation; each no doubt stimulating the other. The importance of interest in the matter has seemed especially important to me, in observing children's behavior throughout the tests. I often sensed that many of the high I.Q. students tested in the schools were simply not interested in the tests or in art at all; that they felt a positive antipathy toward the more decorative, sensuous aspects of art; that this antipathy tended on the whole to increase with age and to be much stronger in boys than in girls. This accords with the obvious fact, so disappointing to art teachers, that large numbers of children who apparently show talent in art at an early age drop it as an activity later on. What may appear in tests and questionnaires as a decline of ability in art may be mainly a decline in willingness to use and exhibit what ability one has. The result, however, is eventually the same; since an ability unused or inhibited tends to atrophy.

Educationally, it seems important to decide, if possible, the question raised above: to what extent are these apparent declines in ability and interest, especially along decorative lines, due to cultural influences? If largely so, then we may hope to counteract them by building up more respect for art, including decorative art, as a respected masculine interest. If the cause goes deeper, the problem is harder. We must decide how much to fight against nature, the nature of adolescent development. Again, we should ask very searchingly whether art is now presented to adolescents, in schools and museums, in a way to attract the changing interests and abilities of that age level. There is no great difficulty in interesting adolescents in sports, moving pictures, clothes and ballroom dancing, all of which possess features akin to visual arts, including the decorative. What have they which school and institutional types of art lack? Some of the answers are obvious, but what to do about it is not so easy to decide.[13]

In the remark just quoted, Mrs. Lark-Horovitz states that the main difference between the two groups is not "developmental". Although the Specials are a little more advanced on the scale of successive types or stages, this does not seem to be the essential difference. "Developmental" includes diminishing as well as growing abilities, as we have seen, but this again fails to distinguish the two groups. The Specials do not lose their decorative interests faster than the others. Often they seem to hold them longer, especially when explicitly directed to such a task, as in the "Beautiful Page" experiment.

However, the other characteristics which do help to mark them off are also developmental, in another sense. One can say of a certain six-year-old that he has a good all-round development, although he is not at all precocious. He has not developed in any way beyond the typical six-year norm; but differs from certain others of his age in having developed just that far along more different lines at once. Development of the individual, in other words, is potentially a process of growth in many distinct though related functions, bodily structures, and abilities. No one grows equally fast or far in all of them at once. Some go ahead precociously along certain lines, and are arrested, slow, or even

[13] For further discussion, see articles by the author entitled "Adolescence and Art Education", in the *Bulletin of the Worcester Art Museum* for July, 1932, and in Rusk, W. S., *Methods of Teaching the Fine Arts*, University of North Carolina Press, 1935; also "The Art Museum and the Secondary School", in *Progressive Education*, November, 1937.

regressive along other lines. Now the ability to draw in a visually realistic way, rather than schematically, is apparently an ability which increases rather steadily among all children, under present educational conditions. It seems, therefore, to be intimately bound up with the process of maturation, and is therefore called developmental; perhaps a better word would be "maturational". The other kind of characteristics (here called "constant" or "rare") do not seem to vary definitely with age. But, at the same time, they may be more highly developed in one individual than in another. Nearly everyone has a highly developed desire for sweets at an early age, and in some it remains constant all through life. Some have a highly developed musical interest at an early age; no doubt partly due to innately high development of the auditory nerve systems. In some the high though early development is in visual alertness. Later experience and learning may in a sense develop these early traits by redirecting, complicating, and refining them; while in another sense—that of relative strength or sensitivity—they do not develop, but appear as markedly in childhood as they ever will.

Essentially, then, it is not mere precocity in visual realism that we must look for as a sign of artistic talent (though this may well occur as one indication), but rather such characteristics as perceptual, imaginative, emotional alertness, directed by preference into visual experience and the manipulation of visible materials. Such signs will never appear abstractly, in a vacuum, but only in some concrete activity or production. Hence the need for "tests" to call out such behavior. But we must read between the lines of their results, not judging them for obvious signs of maturity, special training, or sophistication. Rather we should look for signs of that vitality, sensitivity, eagerness, inventiveness, and organizing power which distinguish excellence from mediocrity on every age-level and at every stage of cultural development.

It is possible that such characteristics, although "constant" or "non-developmental" in one sense, can be developed in another sense by proper educational and other influences; that is, stimulated into more active and harmonious exercise. Is not this the essential task of education in art and in other subjects? There would seem to be little value in merely hastening the progress toward visual realism, or other mature ways of drawing, any more than there would be in trying to accelerate physical maturation. It seems a better ideal to help each child achieve maximum fullness of experience, happy and successful living (however these are conceived) on each age level as he comes to it, rather than hurrying on to the next. It would seem better to help him draw, think, feel, and play as well as possible in the six-year-old manner while he is a six-year-old. Accordingly, we should not put a premium on mere maturational advancement in drawing or any other ability. We should not, perhaps, even refer to the stages in such advancement as "the development of drawing ability", for that is too broad a term, and omits the other phases in drawing ability which we are now considering. On the other hand, any attempt to retard artistic maturation artificially, so as to preserve the decorative charm of schematic art, runs the risk of unexpected repercussions on general mental development.

Much remains to be done in showing the deeper significance of the tendency in children's drawing toward visual realism. Its suggestive analogy to art history through the Renaissance has been mentioned above. More specifically, the schematic stage of early childhood bears certain resemblances to adult drawings of the neolithic period. Culturally, this was an age of great development in language, including the beginnings of written language. It was an age when humanity was struggling to form its basic set of concepts of the main types of person, animal, plant, inanimate object, action, event, and abstract quality. These emerge later on in Egyptian and Chinese pictographs. Schematic drawings, simplified and apparently crude, were an important means in this process of distinguishing main types and giving them written as well as vocal symbols. Visual realism was not essential at that stage, and would have been an unnecessary encumbrance. In young children, also, the period of schematic drawing is one of recognizing basic types and forming basic concepts. Schematic drawing is conceptual drawing, of the way a thing is understood to exist; of what seem to be its most interesting and important features, rather than of how it would look to a disinterested observing eye. Drawing, clay-modeling, and other modes of representation play an im-

portant part in aiding intellectual and perceptual development as well as manual coordination.

K. Educational Implications

What, then, should be the role of art education in early childhood? Has it not been an error to urge visually realistic drawing, from a model or otherwise? Would we not be further mistaken to favor such drawing by any scale or test which restricts the idea of "art ability" to realistic drawing ability, or to any other way of conforming to adult standards? The alternative is not to discourage precocity; when it occurs along with signs of health, well and good. But a paramount need may be to utilize schematic drawing itself, while it lasts, as an aid in certain phases of mental development. Indeed, schematic drawing can itself be developed into mature scientific diagramming, mechanical drawing, and other types of expository art involving conceptual realism, without ever yielding place entirely to visual realism.

An associated problem arises in the relation of children's drawing to their ways of appreciating pictures made by others. The present research, and supplementary teaching experience at the Cleveland Museum, indicates that young children do not prefer looking at the kind of pictures they make themselves. While making schematic pictures, they tend to prefer realistic ones. In some ways, they treat adult art as they do the whole outside world of objects: as something to be looked at selectively, in a childlike way, for what interests them. If asked to copy a realistic picture, they will do so with highly abbreviated schematism, and will either not notice or not be bothered by the discrepancy. They can enjoy and appreciate, to a limited extent, much more mature and realistic art than they can produce. Often they tend to look down on primitive art which is nearer their own productive level. They are not much interested in what the adult artist tried to emphasize, or how he secured his realistic or decorative effects. They are more interested in the subject represented; they like to project themselves into the scene and perhaps identify themselves with one of the persons. Average older children maintain this type of interest, as Mrs. Lark-Horovitz shows, while Specials tend at an earlier age to adopt the more specialized technical and visual attitude of the adult artist. This of course has been stimulated in the Specials by teaching; but they respond to it more than the Averages do.

Again it would seem wise to consider these psychological hypotheses, in working out our teaching methods. To what extent shall we try to influence all children toward liking contemporary non-realistic art, or toward liking art for its technical and purely visual, formal aspects? Some, with special visual talents and development, may take to such experiences easily and heartily; and if so, well and good. But for the rank and file, and for all in early childhood, there may be psychological values which we do not now understand, in using art appreciation as a means to vicarious experience, to enriched and heightened conscious phantasy; not in isolation, but linked with other studies and practical experiences.

Drawing is not, and perhaps should never be, a required subject for all secondary students. But art appreciation, properly taught, might well be advanced to that status. For young children, drawing, painting and modeling are already so recognized in a great number of schools. They are not sufficient as media to exercise productive impulses in visual form, and should be supplemented by crafts, dancing, and theatre, as well as by music and literature, to give adequate scope to art education in a broad sense. Accordingly, studies like the present one should be supplemented by studies in other arts, to raise there similar questions about normal and accelerated development and other signs of art ability. Children's drawings, however, will remain peculiarly worthy of attention, because of the clear, permanent, easily produced and handled evidence which they present. It is hoped that the present report, inconclusive as it is, will point a few paths for later inquiry.

The experience of the Cleveland Museum teachers has been that any light on a student's level of artistic development, and on his peculiar interests and abilities, is of direct value in adapting educational methods and contents to the human factors involved.[14] It brings immediate returns in more successful teaching, whether or not it can be mathematically expressed and verified. The procedures here outlined for securing such infor-

[14] On the general relation of psychology to museum work, see B. Lark-Horovitz and F. H. Keith, "The Role of the Psychologist in the Art Museum", Journal of Consulting Psychology, 1942, Vol. VI, No. 2: 82-84.

mation are placed at the disposal of teachers in the hope that improvements will be quickly made in them.

L. Aptitude and Achievement Tests; the Evaluation of Art in Schools

The researches here described have been, for the most part, in the field of aptitude rather than achievement tests. They have dealt with the problem of discovering and estimating potential talent, probable ability to learn and create in visual art. They have not dealt much with grading achievement or actual learning in art; largely because the Museum's classes for children do not involve definite grading.

In schools and colleges, however, the emphasis is different, and consequently there is more need for improved measures of achievement; for the grading of work actually done in courses. Many schools and teachers are not sufficiently interested in predicting individual aptitude to experiment with special devices for it. Some of them feel (with a good deal of justification) that the best way to discover talent at present is in and through regular course work. In any case, their principal job is to teach large classes, and to decide which students deserve promotion or diplomas at the end of the year.

The lack of definite, accepted methods for grading achievement in art is a serious bar to the development of art in the curriculum, especially in secondary schools. Colleges and college entrance boards hesitate to give credit for entrance to a subject whose standards of achievement are so vaguely defined, so much in dispute among individual teachers. Boards of education hesitate to class it as a required subject, or even as an elective for the student aiming at college. Consequently, many of the best students—those of highest intelligence, ambition, and all-around mental ability—are discouraged from studying art in secondary schools. This in turn reacts on the nature of art courses, for they are too often limited to a narrow sort of technical training for the hand-minded student.

The traditional, academic ways of evaluating work in art are of course available. One can grade the students fairly definitely on specific skills and information: on their knowledge of art history; on their ability to draw a scene and figures with correct anatomy and proportion.

Perhaps any method of grading is better than none at all. On opportunistic grounds, it may be argued, the art teacher would do well to maintain and clarify the old methods, and thus try to gain more recognition for his subject. But this would obligate him to teach the subject and appraise merit in an academic way, which many progressive teachers refuse to do. On the contrary, they wish to allow individual experimentation, and to stress originality, aesthetic insight, intelligent handling of new problems, rather than facts and set skills. In that case, their task of grading becomes difficult, involving estimate of intangibles. The more extreme among them even object to grading students in comparison with each other, or with any general norms. They are interested only in whether a student is progressing from his own starting-point, along his own line.

So radical an attitude precludes any possibility of really standardized grading. Nevertheless, the Museum was called upon by the General Education Board to give some help, if possible, in the task of evaluating art work in a progressive, non-academic way. Its chief contribution was made in the form of the "Art Project Analysis Record Sheets" reproduced in Appendix II and III. As mentioned above (§E), these are devices for systematizing and clarifying evaluation. They are also aids in planning projects and in keeping track of them along the way. Their use involves no assumptions about what objectives are best, or what kinds of art students should produce or prefer. They can be used in academic teaching or in ultra-progressive, individual projects. Their aim is to help and encourage both students and teachers to think out their own objectives intelligently; and, having done so, to estimate advance toward them (as well as possible indirect gains) explicitly and consciously, rather than vaguely and arbitrarily. They can be used alone, as sufficient records where no grades are desired, or along with any other type of tests and grades. They provide an intermediate approach to evaluation, between conservative and progressive extremes. Indirectly, they have been found to improve teaching by making both teachers and students plan out their work more clearly and systematically.

Such individual records, and the projects they deal with, can well be supplemented by diagnosis of each individual's ability and

stage of advancement. Preferably, the diagnosis should come first, and the project be mapped out from the student's present stage as a starting-point.

The device mentioned above (§E) as the "Machinery Drawing Experiment" also enters the field of achievement tests. It is, in fact, an example of how specific achievement and ability to achieve can be observed under experimental conditions. It isolates a specific act of learning and analyzes it into three main phases: first, the student's ability to deal with a given art problem before receiving specific instruction; second, the instruction itself (here involving visual demonstration and comment); and third, the student's ability to deal with the same problem after being modified by the intervening experience. Both problem and instruction can of course be varied indefinitely; the essential idea being to observe how different individuals respond to an identical opportunity for learning. However the results are graded, the teacher has significant evidence to use in the process.

It is not for the specialist on psychological tests to decide what should be the content and the methods of courses in art. Their requirements are varied and changing, often involving compromise between ideals of aesthetic development and vocational or general educational needs. It is evident, however, that academic art-school methods are no longer adequate for art in general education, to determine either teaching or grading. No single, standardized achievement test can suffice to grade all art courses, even on a single age-level, any more than any single aptitude test can measure all sorts of artistic talent.

The final decision is for teachers and administrators to make. But the testing expert, in art as in other subjects, can serve by helping each teacher (a) to think out clearly his own objectives; (b) to devise ways of estimating progress toward the chosen objectives. The objectives, and consequently the tests of achievement, can be for a single student, a class, or a whole school system; for a day, a year, or a whole curriculum. The tests can be formal and standardized, or impromptu and casual. All have their values. But through proceeding along all these lines, and with the test expert in close touch with the teacher, art in the schools can be gradually rationalized. The results will be significant, too, for the measurement of aptitude and talent; for only through repeated concrete achievements, under different conditions and with different materials, can ability be manifested.

II. RESEARCHES ON CHILDREN'S PRODUCTIVE ART ACTIVITIES

BETTY LARK-HOROVITZ

A. THE ESTABLISHMENT OF STANDARDS FOR ESTIMATING CHILDREN'S DRAWING ABILITY BY MEANS OF AN ANALYSIS BASED ON AGE-LEVEL NORMS

1. Specially Gifted Children

When we refer in this article to specially gifted children, we mean children whom we believe to be specially gifted in the visual arts. It is necessary to define the meaning of the term *specially gifted*. What are the standards that mark a child as average or gifted? Are those standards absolute or relative?

The specially gifted child is one whose understanding, learning or productive capability is greater than that of the average child. This superiority either has a general character, in that the child is superior to other children in all or nearly all his various abilities; or is partial: that is, superiority in one or a few particular abilities. In all other abilities no great difference is noticeable between this child and other children. Superiority in one particular ability or a group of such abilities is the kind with which we are concerned here.

We must discuss whether this special ability in visual arts is connected with higher intelligence, with abilities above normal in activities or branches of learning other than the visual arts, and whether the special ability shown in matters connected with the visual arts is transcendent in a general way.

How do we ascertain special ability? Usually, the selection is made by some individual who, dealing with a group of children, considers some to be superior to the rest. The selection thus depends on that individual's standard of superiority in judging the expression of an idea or the originality of the idea which is expressed. The standard, therefore, depends on the personal art standard of the individual who does the selecting. It also depends on the level of ability in the group in which the chosen child is promin-

ent. In a low-grade group, a mediocre child will seem "superior".[1]

Hence, the problem is very complex. Moreover it cannot very well be simplified. The establishment of standards for either average or superior ability is bound to be arbitrary as long as they depend on the personal art standards of individuals. Individual standards of art differ, and, between two opposite opinions, neither of the two can be proved right or wrong, better or worse.

2. *Variation in Art Standards and Art Judgments*

The complexity and variation which exist in actual art judgments by recognized experts were demonstrated by a comparison of judgments of children's drawings by different judges.[2]

Nine judges—two university professors of aesthetics, two professional artists (painters), two curators of museum collections and three art educators—were asked to classify as 'best' or 'worst' one or more of a group of 116 drawings by twelve-year-old boys and girls. The judges were asked to explain their classification "in terms of presence or absence of art (drawing) qualities". Of the 57 boys' drawings, the nine judges chose 18 as best and 16 as worst. Yet, a majority of votes was secured for only five of the best and three of the worst drawings. The judges' justification of choices, in terms of representative qualities, aesthetic means or technique, varied so little that, theoretically, their standards did not really differ. They intended to base their judgment on the presence or absence of about the same kind of qualities. The difference in choice of drawings and the similarity of artistic postulates show plainly that the vagueness of terms, such as 'composition', 'relation of parts' or 'unity', leads to a surprising difference in application. Furthermore, some single quality in a drawing often exercised a strong appeal to some one of the judges, and influenced his opinion.

3. *Establishment of Performance Norms in Drawing*

a. Introduction. Children perform very differently at various age-levels, and therefore cannot be compared without allowing for age-differences. When we see a six-year-old's drawings and a ten-year-old's, we may say at first that the latter is better than the former, as long as we do not know that there is an age-difference. But we may reverse our judgment when we are told about the ages of the two children, and decide that for a ten-year-old, his drawing is less good than that of a six-year-old. On the other hand the drawing of a fourteen-year-old may seem better, more mature than that of the six-year-old, but we may consider it inferior in color qualities and originality, thus implying that the six-year-old has some desired characteristics which the fourteen-year-old has not, or no longer has.

Norms, therefore, cannot be established in a uniform way for childhood in general, but must follow the age-levels of childhood and adolescence, thus specifying the characteristics which are normally present at a given age-level, or missing at another. Age-level norms would thus follow from the first scribble through all years to adolescence and adulthood.

Performance norms can extend over a great variety of art products, such as drawing, modeling, building, or crafts. They also can extend over any amount and kind of characteristics which are visible in the products.

b. Selection of type of art for study. In dealing with visual arts it seemed advisable for us to select a type which combines great variety of characteristics. Children's drawings were chosen for this reason and for the purpose here described. Moreover, since we wished to investigate art abilities primarily, it seemed advisable to restrict the norms to those characteristics which are essential and inherent in visual art, and not to digress too far into other fields (such as personality interpretation or testing of intelligence by means of art products).

c. Analytical procedure. The procedure used for the establishment of norms is analytical; that is, it enumerates and classifies a

[1] The "Special" children referred to in this experiment are selected on the recommendation of their Museum teachers. Most of them have attended Museum classes for at least one year with unselected children. If the selected child shows promise during a trial period of three months, he joins the Special group regularly. The work of the Special children is neither uniform nor of the same general quality. Most of it is superior to that of average Museum children, but that of a small number of children is a little more promising than that of the best Averages.

The mean IQ of the Average group studied is 108.3 with a range of 60 to 155, while that of the Specials is 115, with a range of 89 to 127. The selection of the Specials is not necessarily correct, since it is based on the judgment of Museum teachers, and crudely checked by Meier–Seashore and Lewerenz tests. The Specials averaged very superior to superior, and very superior respectively for each of these two tests.

[2] See: "Comparison of Subjective and Objective Judgments of Children's Drawings", by Betty Lark–Horovitz, *Journal of Experimental Education*, 3, X, 1942, 153–163.

number of those characteristics which are perceptible in drawing and (we believe) significant as to drawing ability.

The analysis necessary for the establishment of norms was undertaken in a simple fashion; many observable characteristics in children's drawings were listed. Terms implying values as general as 'good' or 'beautiful' or 'skillful' were not included. As more and more drawings by children of different age-levels were analyzed, additional characteristics were checked whenever they were apparent. Each was defined as strictly as possible, and the person in charge of checking adhered closely to these imposed definitions.

By means of the final 'Analysis' we recorded the drawing characteristics of ten consecutive age-levels, boys and girls (50 to 60 in each group), for four different subjects per child.[3] The four different drawings gave each child a chance to show his drawing ability along somewhat different lines. Identical sets of crayons were used for all drawings by all age-levels. Thus differences in technique due to different media were eliminated.

Of the characteristics checked, there are some which change by age-level. We can call these *developmental*. Others remain *constant*. There may be as many eight-year-olds' drawings as thirteen-year-olds' which have a certain characteristic. In other words, some characteristics appear in similar percentages throughout all age-levels. Others appear in an exceedingly small percentage at all age-levels, occurring in only a few individuals.

All these various characteristics occur in drawings of different subjects made by different children. Hence, a child's drawing may be placed within a group according to the ability displayed in it, with regard to his age-level. He may be average or typical; that is, most of his characteristics check with the norms of his own age-level. He may be retarded; that is, most of his characteristics resemble those occurring mainly on a younger age-level; or he may be advanced; that is, most of his characteristics resemble those of an older age-level. Among the latter we usually find the specially gifted children, though not all advanced children are specially gifted.

[3] 1. Make a picture of whatever you like best to draw.
2. Draw a picture of a man.
3. Make a picture showing just how your classroom looks while the children and the teacher are there.
4. Make a picture showing what you would like to do next summer.

d. Judgment of Drawing Ability on Basis of 'Analysis', General. The actual number of characteristics which check with the norms of an age-level is not the decisive factor in placing a child's ability, but rather the *kind* of characteristics.

Judgment of a child's drawing ability on the basis of the analysis of a single one of his drawings may be very misleading. Our own 'Analysis' is substantiated by four drawings per child. Originally seven problems were given. They are filed on record;[4] two of these were not analyzed; one, No. 5, has been analyzed in a separate study.[5] If our 'Analysis' were to be standardized and the problems given to all children all over the country, it would be advisable to give them at different but not widely separated dates (perhaps a week apart), so as to give each child the benefit of latitude concerning possible momentary moods, physical well-being, fatigue-elements, and similar disturbing factors. For the present study, conditions in the Museum hindered the distribution of the problem over various sessions, which would have been a great advantage.

4. Nature of Drawing Analysis

One single drawing of one individual child does not bring the same results as a second, third, or fourth, as we could see from our 'Analysis' of four drawings. If the problem calls for the drawing of objects with which the child's graphic vocabulary is not familiar, or for a more ambitious composition, when the child has not tried much grouping before, or if it calls for decoration, the unfamiliarity of the subject may hinder the child in displaying some of the characteristics which he will bring out under more favorable conditions. Hence the combined analysis of several drawings, treating different subjects, will give a truer picture of the child's ability, especially if each drawing has been made at a different time.

5. Section I. Subject Matter

Our 'Analysis' is divided into *three sections*. In *Section One* the actual *subject* of the given drawing is checked. These checks pro-

[4] The other three were as follows:
5. Make a picture of the most beautiful rug you can imagine.
6. Make a copy of this picture on your paper (while a lantern slide of a still-life painting was shown).
7. Make a drawing of the animal which you see (while a moving picture with horses was shown).

[5] "Analysis and Evaluation of Rug Designs from the Seven Drawing Test" by Edward N. Barnhart. In manuscript at The Cleveland Museum of Art.

vide a description of the subject, since they mention the things contained in the drawing: figures, animals, or landscape; the activity represented, such as sports, travel, or reading; the setting which the drawing uses—city or country—and the details which the child selected—flowers, trees, or mountains. This section also records any influence from school, magazines or cartoons which is easily traceable. It also records whether or not the drawing is supplemented by some kind of text.

Section One, though interesting and useful, does not bear directly on the representation of the drawing nor on the aesthetic means employed, nor on technique. It is mainly concerned with the content, and thus illustrates general interests by age-level. (See Graph I, on Subject Choice.)

Complementary to this choice of subject matter for active d r a w i n g are children's choices of pictures.[6] Of course the children's choices are limited by the r a n g e of subjects shown in the pictures. Nevertheless, a comparison of choices is interesting. (See Graph VIII.)

Pure landscape, for example, is a subject which takes up a large interest-area, both in children's art production and in their art appreciation of pictures by others. A combination of figures and landscape meets with interest in picture appreciation through all age-levels. In drawing activity, however, this combination decreases, in spite of the permanent interest in landscape. This decline is due to the realization of difficulties in figure representation once the peak of the schematic stage has been passed. The only picture of a figure alone which was presented to the children in this appreciation study is a full-length portrait. Preference for it decreases steadily with advancing age. The subject of a single figure can be compared to those drawings which represent figure alone. Those representations are not very frequent.

No portrait head was shown among the twelve pictures of the Art Appreciation Study, and thus we cannot parallel the steady increase in drawings of heads. The twelve pictures of the study had only one animal picture, where birds were seen within a landscape setting. A parallel with children's drawings of these subjects, that is animals alone and animals with landscape, shows that fewer drawings of these subjects are produced than are appreciated.

The girls' liking for flower pictures is reflected in both their preference for such pictures and their own drawings of still-life, which mostly contain a flower arrangement. On the other hand, the boys' love for transportation of some kind (boats, trains, airplanes) is reflected in their appreciation of and interest in the only picture containing a boat battling its way through the waves.

The analogy between children's choices of pictures and subject choices in their own drawings cannot be carried through fully because of the inaccuracy in the parallels of subjects and because, in art appreciation, many different associative factors are involved, while in drawing activity the ability to draw the interesting subject is a factor which is often decisive.

6. *Sections II (Representational Qualities) and III (Aesthetic M e a n s and Techniques)*

Section II treats different aspects of *representation*. Were the objects in the picture drawn in a schematic[7] fashion? In a mixed[8] fashion? Did they look true to appearance?[9] Was the third dimension[10] represented? Were the size relationships of the objects correct or not? Is the representation such as to show

[6] See Graph I. Key numbers correspond to those in Graph VIII and describe content of both; base line indicates 0 to 100%. See also "On Art Appreciation of Children. I. Subject Matter", *Journal of Educational Research*, XXXI, 1937, p. 118–137.

[7] The *schematic* stage is one of the three principal stages in drawing which is peculiar to children's development. It is preceded by the *scribble* stage, and can be divided into the *primitive schematic* and *full schematic* stages. In the schema, people, animals and other objects, are represented with the help of simplified symbols and outlines which reduce the shape of the represented object to a combination of ovals, rounds, squares, and dots. The child outlines the different parts of his objects separately and unites them by adding one part to the next. It is characteristic of the schema that different views of an object will be combined into one drawing, or different objects into one composition, but as if seen from various points of observation (from a shifting point of vantage). Thus, objects which may be hidden from sight by other objects are nevertheless represented. This kind of picture gives the impression that the child took, mentally, a walk around the obstacle to see what was behind it, and having found out, drew it.

[8] The *mixed* stage in representation is transitional and intermediate between schematic drawing and drawing true-to-appearance. It combines objects, some of which are drawn schematically, others drawn true-to-appearance; or it represents objects which are in part schematic and in part true-to-appearance.

[9] A *true-to-appearance* representation endeavors to represent objects as they appear; i.e., in outline, proportion, colors, and dimensions which are similar to their appearance. Such a drawing does not yet represent the third dimension, and thus gives an appearance of flatness. Several objects in a picture are assembled in such a way that hidden objects or part of them which cannot be seen simultaneously remain also hidden in the drawing and that a single point of vantage (or observation) is maintained.

[10] The *perspective* stage is an extension of the true-to-appearance stage inasfar as objects are represented as true-to-appearance with the addition of a more or less correct linear perspective and representation of distance.

knowledge of the objects (observation) and of their way of operating? Is motion represented? How has color been used in order to support the actual representation? This part also records the grouping of objects within the picture, thus differentiating between the independent representation of single objects and the related representation of all.

Section Three deals with *technique* and *aesthetic* qualities. As to technique, the use of lines, areas, and colors (beyond their purely representational use) was checked as well as the consistency with which the medium has been used. In regard to characteristics of an aesthetic nature, we checked compositional arrangement on the page, the balance of parts within the whole, the thematic development of lines, hues, or placement for decorative effects, the clarity or indefiniteness of form, symmetry and asymmetry, unity of arrangement, and number of colors used. Style, such as naturalism, impressionism, or expressionism, if anywhere apparent, is also recorded in this section.

The results discussed in the second and third sections, dealing with representational, aesthetic and technical characteristics, can be divided into three groups:

a. Characteristics which dominate at the younger age-levels and decrease or disappear at older age-levels, and, on the other hand, those which are non-existent or very rare at younger age-levels and increase substantially with advancing age-levels. Both kinds may be called *developmental,* since beyond doubt, individuals pass through stages displaying them.

b. Characteristics which appear fairly *constantly.* A certain percentage of children at all age-levels show them, but neither more nor less children seem to have them or seem to acquire them, be they younger or older.

c. Characteristics which are *rare* at any age-level and which sometimes increase slightly or which maintain the same level of occurrence.

7. Developmental Characteristics

a. Representational stages. That the schematic, mixed, true-to-appearance and perspective types of drawing indicate developmental stages is proved by the fact (and sustained by numerous previous investigations) that children go first through the schematic stage and then through mixed stages to a representation which is true to appearance. No other order occurs. Some children may and do remain in the schematic stage until adulthood, or under unusual circumstances may regress toward schematicism after having reached a later development. Yet, they cannot regress without having first passed through the previous stages. In other words, none of the earlier developmental stages and none of their most outstanding characteristics are ever omitted.

Graph II (Developmental Chart) records those characteristics which dominate at the younger age levels and decrease or disappear at older age levels, and those qualities which are non-existent at younger age levels or appear later, and from there on increase.

The representational development shows that children on entering school have passed the scribble stage, that only a small percentage use a primitive schema[11] and that the majority of children operate by means of a fully developed schema. At the age of eight, very few children enter the mixed stage; that is, combine objects drawn wholly or partly true-to-appearance with objects drawn schematically. At 10 and 11, many children have entered the mixed stage, and a few have progressed to true-to-appearance drawings. Also at 11, an occasional child will introduce line perspective and distance, though usually not solid modeling. While the schematic drawings decrease and the true-to-appearance drawings increase between the ages of 12 and 15, the number of mixed drawings remains fairly constant.

The figures in Graph II are taken from the analysis of the first drawing which permitted a choice of subject. In other words, children could represent in this first drawing those objects which they liked to draw, which they had surely drawn repeatedly and which they believed themselves well able to represent. The representational development of all four drawings combined (see Graph III, Comparative Chart) is slightly lowered as regards the true-to-appearance status of age levels 12 to 15, and simultaneously shows a longer maintenance of the schema. Apparently the three other subjects, especially number three (the classroom) introduced objects and arrangements which the children had not so often drawn, and therefore had not had an

[11] The primitive schema is the early stage of the schema. Children, then, draw their schematic symbols in an incomplete manner; that is, they omit parts of an object, e.g. the whole body in the human figure, thus representing it by head and legs only. Also, the various parts are represented with less details and less definite contour.

opportunity to develop as well as those used in drawing One.

Comparison with the representational status of drawings that served in two other experiments ("Machinery Experiment" and "Visual Memory Experiment"[12]—one calling for the picturing of some kind of machinery, the other a drawing of a bear) shows slight differences in representational status. These must be due to the unfamiliar objects called for in the directions. The comparative chart plainly demonstrates that development in representation depends on age, and little on subject matter, with slight variations when representing unfamiliar subjects. Specially gifted children behave similarly.

There is, however, a remarkable difference in representational status between Average and Special children. Since we do not differentiate between the two groups before the age of 11, and since the number of Specials is necessarily very small, Specials cannot be considered here per age-level. Hence, for purposes of comparison of qualities, three age-levels were combined, 11 to 13 and 13 to 15, thus overlapping at 13. Even so, the numbers are small. There are 24 younger and 69 older Specials. Whenever younger Special boys and girls are treated separately, the number under consideration—12 for each sex, as compared to 140 and 151 respectively of the same group of Average children—lowers the significance of the results enough to make all conclusions tentative and in need of cautious interpretation. The older age-levels, 13 to 15, contain enough Specials to confirm the significance of any conclusions, in spite of the fact that there are nearly four times as many Average children in this group. Thus, the small number of the younger Specials and the fact that in our results no distinction can be made between Specials and Averages younger than 11, prohibit the actual tracing of differences between the two groups back to the time of their first appearance. From the Representational Development columns on Graphs II and III, it is clear that the differences in representational status between Average and Special children, both older and younger, are very great. We also see (Graph II) that true-to-appearance representation starts at nine and from there on increases slowly. Its percentage remains small until the ages of 13 and 14. The study of subjective and objective judgments, mentioned earlier, showed that those drawings of the 12-year-olds which were called 'best' by a majority of judges were all advanced in representation.

We feel that an advanced representational status within an age level is *one* strong characteristic or indicator of special giftedness. It is by no means the only one, however. On the contrary, if this happens to be the only characteristic in a child's drawings, and if others (to be discussed later on) do not also appear, we must believe that the advanced representational status is an indication of mere precocity rather than of special giftedness.

When the change in mental attitude (which, on the whole, prompts expression through schemata or true-to-appearance representation) takes place at an unusually early age, it can be attributed to a visual perception that is sharper, more alert and more detailed than that of the average child of the same age-level. It expresses itself frequently in a visual medium. Thus an early indication of this change of mental attitude points to a child who is probably specially gifted.

Development of the human figure through various representational stages shows that children favor and have developed a front view at the age of 6; that, as they proceed in developing a profile view, the number of representations of front views drops and reaches a low from 10 to 12, that is, at a time when about half of the children draw still in a purely schematic way. Between 13 and 15, when mixed and true-to-appearance representations prevail, they go back to the front view, perhaps because the difficulties and unfamiliarity of true-to-appearance or mixed representations are fewer in front view, or because at that stage a certain figure-stereotype is used which is a true-to-appearance front view aspect, mostly due to representations seen on magazine covers and fashion plates.

The standing figure is the usual thing at younger age levels. Between 9 and 13, half or less than half of the children stop making a full-length figure. Instead, they make head and shoulders, or a half-figure. Between 13 and 15 they return to the full, standing figure. Very few children, and only from 8 on, try sitting figures.

There is also, in the drawing, a change in the development of surroundings of the

[12] Lark-Horovitz, Betty. "On Learning Abilities of Children as Recorded in a Drawing Experiment: II. Aesthetic and Representational Qualities." *Journal of Experimental Education*, 1941, 346–360.

main object or of the figure. At the ages of 6 and 7, nearly all children draw some surroundings. From 13 to 15 more than half make none at all. At younger age-levels between 20% and 30% of the children have richly developed surroundings. As age increases, these two characteristics decrease (Graph IV).

b. Use of color. Beside the development in representation, there are a number of other characteristics which, because of their regular increase or decrease throughout age-levels, are developmental. The most remarkable and perhaps also the most interesting group of these is involved in the use of *color*. In 'Use of Color', on Graph II, we can follow the steady decline in the use of colors in general, and in the use of many colors. The younger age-levels (6 to 10) use many colors; four or more are prevalent. From there on we see a rapid decrease in multi-colored drawings, a prevalence of drawings with two or three colors and an increase in preference for monochromes. Boys show this decline in the use of colors much more sharply than the girls, who, with the exception of an apparent break at 11, still favor the use of four or more colors through the age-levels 12 and 13.

The use of many colors, however, is not identical with brightness of colors, either as contrast, spotting or selection of particular colors. Under the heading of Bright Color, Graph II, we see that brightness of color also decreases with increasing age, and again more rapidly with the boys than with the girls. Since, on the other hand, efforts have been made in most schools, during the past decade and longer, to encourage the use of bright colors during junior high school age-levels, we cannot attribute the decrease of color interest and brightness to school influences. Moreover, the preference for few colors and monochromes shows itself so strongly in both special groups—and here, too, with the same distinction between sexes—that we must feel satisfied to interpret it as a developmental factor. This interpretation is sustained by the results of our art appreciation studies in that it was found that in an exhibit of colored and uncolored portraits, the preference for uncolored pictures increased sharply with advancing age, and again more with boys than with girls (Graph VI). The decrease of use of colors in No. 2 of the four drawings ("Make a Picture of a Man") where children portrayed some person, and the increase of preference for uncolored pictures in Art Appreciation Study II (Portrait Study) show an obvious parallelism with age level.[18] The decrease of preference for and interest in bright colors is thus corroborated from the appreciation angle and coincides with these age-levels in which use of bright color in picture-making decreases. Graph VI indicates the kind of color preference per age-level and sustains the fact of the decrease of many, bright and clear colors, versus the increase of delicate and subdued colors.

Outstanding use of color can be effected by contrast and by other means. The use of contrast for an outstanding effect also decreases with age-level. Thus, effect by color contrast is used by few children at all age-levels, but by more younger than older children.

c. Clarity of outline. This increases with age. Outlines of areas against white or against other areas become sharper or more definite. (Graph IV.)

d. Representational and thematic unity. These are developmental. *Representational unity* is achieved wherever details are so related to the whole that they give an impression of a united object or scene in space. *Thematic* unity is achieved when details of line, solid shape and color are related so as to produce some amount of design and decorative effect. Representational unity increases through age-levels, while thematic unity in its development first runs parallel to representational unity, then decreases after 11 so that 6 and 15-year-olds show a similar status in this characteristic.

e. Line treatment. Some technical and aesthetic effects can be brought about by line and area treatment. Some of these also show a developmental character.

Ragged and hesitating lines increase with advancing age-levels, especially so from age 13 on. This rather curious occurrence may be explained by the uncertainty of some children concerning the outline of their drawings while in a transitional stage of representation, (e.g., schematic to mixed stages, especially at the ages 13 to 15) when self-criticism is much stronger than at an earlier age and leads to greater hesitation in defining shapes (Graph II). Very few Specials show this hesitating attitude.

[18] See also graph p. 584 and 591 of Art Appreciation Study II.

f. Area treatment. On the other hand, *raggedness of area-treatment* decreases steadily through all age-levels. Since, in nearly all cases, areas are filled in or finished after completion of the outline, their making is not connected with actual representation as is line; hence it is of a more or less technical nature and dependent on skill and patience in execution. Smaller children have neither the coordination nor skill nor patience to fill out larger areas effectively. But older children take more interest in the results of the technique they apply and have also the necessary patience for completing their task (Graph II). Thus, contradictory as the hesitating, ragged line and ragged area developments seem to be, they are really not so; they are, in fact, quite consistent.

g. Grouping. This means the arrangement of objects in a picture. Three or more objects are necessary for grouping. Here we find, first, that girls make more pictures with three or more objects than do boys; therefore more girls tackle the problem of grouping; second, that both boys and girls present fewer pictures with enough objects to call for grouping as they reach the ages of 10 and 11. From there on the small percentage of pictures requiring grouping remains fairly constant. Of the pictures requiring grouping, most grouping is *organized*[14] in the drawings made by the age-levels 6 to 11. From there on we see a great deal of *non-organized* arrangement.[15] Since few children from 12 to 15 have three or more objects in their pictures (especially when they can choose their subject), the distribution of organized and non-organized grouping is not significant and must be considered as an indication only of these trends, but not as a proof. (Graph II)

Among the Specials we find that boys are more inclined than girls to depict many objects. Among Averages the opposite is found. However, only two younger and four older Special girls have enough objects in their drawings for grouping, and therefore the results shown (50% organized and 50% unorganized grouping for the younger, and 100% organized grouping for the older group) are of little value. The fact that most older children depict single objects is in itself significant, since they are obviously conscious of their inability to group, and try to avoid this situation by concentrating on single objects.

[14] The term "organized grouping" refers to three or more objects or figures so balanced and interrelated in regard to position and line or color that they definitely form into a unified group.

[15] The term "non-organized" refers to three or more objects placed in a picture without balance or relation to each other, rather haphazardly drawn on the page.

8. Constant Characteristics (Graph V)

a. Decisive line. Around 30% of children of both sexes draw with decisive lines. We can perhaps interpret this occurrence by saying that about 30% of the children of all age-levels are sure of what they want to draw and how they want to draw.

b. Smooth area. Similarly a fairly constant percentage of children treat area *smoothly*. This characteristic, however, is not as constant as that of the decisive line. Age-levels 6, 7, and 8 are considerably lower in this respect than the following ages. Special children do not differ significantly from Average ones, but boys possess it in a greater degree than girls.

c. Grouping. The constancy in the ability to *group objects* within the age-levels 6 to 11 and 12 to 15, is closely related to the representational status of these ages. From twelve on, mixed and true-to-appearance representations dominate. Age-levels 12 to 15 show far less organized grouping than the preceding age-levels. Within the former, organized grouping amounts to 45%, within the latter to 75%. Age-levels 12 to 15, whose organized grouping is so much lower than that of the 6 to 11 year-olds, arrange their objects in such a manner that these are coordinated, do not use a standline (see below), and definitely show a relationship which would be disturbed were the drawings to be cut apart. Their ability in grouping is lessened because of the fact that those children who have reached the mixed or true-to-appearance stage lack the assurance which they possessed during the schematic stage, especially for the complicated task of arranging several objects. Age-levels 6 to 11 organize their grouping in a way which is characteristic of the schema and sometimes carry it over into the mixed stage. This grouping arrangement consists of a standline along which objects are lined up, band-fashion. The standline (sometimes even actually indicated) is usually at or near the bottom of the drawing and all objects—people, animals, plants, or houses—stand on it. Where there is more than one standline, the second or third is placed above the first and, again, a number of objects stand on it.

E. N. Barnhart, in his investigation of "Developmental Stages in Compositional Construction in Children's Drawings",[16] notes that some of the children of the schematic stage "work across the page serially, while others work in a 'spotting' technique . . . " and that "the form of composition alters also in drawings of the mixed schematic and visually realistic level. The interest in representing a scene in space leads to a dispersal of objects over the page and away from a simple row form. This calls for some method of organization and general all-over placement; others show an attempt at organization in combining a row of units or a group with a dispersed group in the near (lower) or far (higher) space."

d. Consistent use of medium. Besides organization, other characteristics which are fairly constant are: consistent use of medium, smoothness of area and decisiveness of line. These three are of a more technical nature. Both, *consistent use of medium* (Graph IV) and *smoothness of area* (Graph II), increase first to some extent and then maintain a certain height of percentage through all other age levels. The fluctuations of *decisiveness of line* are small (Graph II).

e. Range of fluctuation, in regard to the term "constancy of a characteristic". For example, we have a fluctuation range of 22% in consistent use of medium. The difference between the lower percentages at an earlier age, and the higher percentages later on is not large enough to warrant interpreting the increase of percentages between six and eleven as mainly or purely developmental, because, even at six, 60% of all children are consistent in their use of medium. Thus, the differences are more in the nature of fluctuations of a constant percentage. If, however, no children at six were consistent in their use of medium and we could see a fluctuating increase up to 22%—in other words, if no more than 22% of the children at any age-level ever reached a consistent use of medium—then the increase and decrease of percentages relative to the total height of percentages would be large enough to prevent an interpretation of consistent use of medium as a constant quality. Graphs IV and V.)

f. Symmetry and near-symmetry. These also remain fairly constant through all age-levels, although only a fourth to a third of the children use this solution in their compositional arrangements. (Graph V.)

g. Motion. About a third of all children at all age levels attempt a representation of *motion*. This, then, is also a constant. (Graph IV.)

9. Rare characteristics

In nearly every case these are not absolutely different from those mentioned before. They are similar in that they represent a different degree or intensity or a variety of an otherwise frequently observed characteristic. Thus, for example, *intentional asymmetry* and *intentional indefiniteness of outline* are varieties of the general asymmetry and indefiniteness which half or more of all children display in their drawings. *Bold line* is a decisive line carried further in a certain direction, while a *subtle line* is also derived from a decisive line but follows an opposite direction from that of the bold line. *Highly organized grouping*, on the other hand, implies unusual grouping as distinct from the ordinary type which a majority of children achieve. Color can be used by stressing *contrasts* or without doing so. In fact, either the one or the other must be used with colors. Yet, it is the way contrast is used with outstanding effect, or the extraordinary way in which some colors are blended, spotted or organized, which constitutes a rare characteristic.

a. Perspective. Charts and graphs show the presence of several rare characteristics between 6 and 15. In representational development we can see that the use of *perspective* is rare, and also the representation of a *sitting figure* or a *three-quarter view*. (Graph II.)

b. Line treatment. In matters of technique and aesthetic means, *bold and subtle* lines are rare and, as far as we can see, non-developmental. (Graph II.)

c. Area treatment. The same applies to the use of graded or blended areas (Graph II) or their texturing.

d. Flexibility, considerable motion, intentional asymmetry. Flexibility in figures of people and animals, considerable motion (Graph IV), in objects as well as in the human figure or in animals, intentional indefiniteness in application of contours and color differentiation, and decorative arrangement are all rare.

e. Unusual degree of effectiveness of characteristics. So are those which represent the

[16] See page 156; also E. N. Barnhart: "Stages in Construction of Children's Drawings as Revealed Through a Recording Device", Psych. Bull. 1940, 37, 581.

extremely high degree of a characteristic. Among these we enumerate all those which represent a successful solution by a few children as compared to the unsuccessful attempts by many, such as realistic motion or sitting position or great flexibility.

f. Placement of the specially gifted child. Varying combinations of these rare characteristics are found in the work of Special children. The two charts which represent rare characteristics (representational and aesthetic) indicate the low rate of their occurrence among Average children and their constancy (non-increase) between 11 and 15. Among Special children, these rare ones occur often enough to lose the status of rarity within the group. Generally speaking, there is an upward trend—increase in ratio—from the younger to the older group of Specials.

Of the characteristics which Average children also possess to a significant extent, and which are either developmental or constant, we wish to draw attention to the use of decisive line and smooth areas. Specials show this in a higher degree than Averages. In representational and thematic unity, Specials surpass Averages, but follow a parallel trend of development. Specials possess some of the rare characteristics mentioned above and tend to increase them. They develop Average ones to a higher degree, and show an accelerated representational development. Hence, specially gifted children within a group can be singled out at an age where distinction in these characteristics is obvious. It is naturally more desirable to discriminate at an early age between children of average and special ability.

g. Repetition of "Seven Drawing Test". We believed that repetition of the drawing test after two or more years and under the same conditions might help in tracing back a number of Specials who were not yet in the Special group at the time of the first test because they were too young. There are three Averages in the Repeat Group who, in their first drawings (9 to 10 years old) are Average, but in their second drawings (11 to 13) exhibit enough of the requisite characteristics to be called Special; and there is one Average who, in both drawings, would qualify as Special though he did not belong to the Special group. We also hoped to find some indication of speedier learning in the use of techniques, or shifts in the use of aesthetic means.

Seventeen Average children and 45 Specials, all of whom had made the Seven Drawings in 1933 and who, at that time were between 9 and 13 years old, repeated the drawing experiment two and a quarter years later.

Regarding representation, we find that ¾ of the Specials, as compared to ¼ of the Averages, had already reached the top stage of development in their first drawing. The entire remaining fourth of the Specials shifted to a higher level of development while 1/5 of the Averages remained at their original, low developmental level. Hence, the repeats do not show any distinctive differences in growth between Averages and Specials during these age-levels and this span of time.

Regarding the growth or appearance of rare qualities, mastery of line or area techniques, use of medium, organized grouping, thematic or representational unity of the drawings, the growth in number of Averages showing one of these qualities is proportionately similar to or even higher than that of the Specials. The difference, again, is that the Specials already show in the first drawing experiment a great number of these characteristics, and therefore could not increase them as many times as average children seem to do.

Effective use of medium (moderately or unusually), for instance, is shown by two Averages in the first experiment and by eight in the 'Repeat'. Twenty-three Specials showed this quality in the first experiment and 37 in the repeat. Were we to go by proportion alone, Averages would have grown 2½ times more in this characteristic than the Specials. Yet, the Specials could not follow the rate of the Averages' growth and quadruple their initial number in the repeat, since there are only 45 Specials. If, on the other hand, we take "unusually" effective use of medium only, we find that one average child (6%) showed it in his first drawing and two (12%) in their repeats, as compared to seven Specials (16%) showing it in the first drawing and 17 (38%) in the repeat; so that there seems to be a similar proportion of advance of Averages and Specials, but the percentages of the Specials carry more weight. Or, if we consider, for example, unusually organized grouping, we find that 15 Special children had enough objects for grouping, and three did it to an unusual degree; in the repeat, only 13 had enough objects for grouping and eight did it to an unusual degree. Under the same

circumstances, one out of the three Average children using grouping had unusual grouping in his first drawing; in the repeat, seven children had enough objects for grouping but only one was unusual. Therefore the impression of progress or failure among the Specials and Averages is misleading because the small number prohibits any conclusions. The number of children who made the repeat test is too small to permit generalization. They are discussed here because they are suggestive of possible results if undertaken on a larger scale.

We can say that the presence of one or several of the rare characteristics which we discussed, even though sporadic in their occurrence and less intense at earlier age-levels, in addition to signs of an accelerated representational development, may all serve as indicators of special talent. If we wish to find out at what age a distinction can be made between Specials and Averages, and if we wish to observe in what span of time Specials start to display characteristics which Averages do not yet display or never will, we must start experiments at the age of 6 and repeat them with the same children every one or two years, and with such large numbers that we end up with a group of at least 50 Specials of Senior High School age.

B. Learning Ability in Art

1. *Complexity of Learning Ability in Art*

In approaching the problem of learning ability in art, we are faced with the difficulty of discriminating between (a) growth or development, that is, a kind of change closely related to the process of maturation, and (b) gains which are due to actual learning, direct or indirect. The difficulty is increased by the fact that, under favorable conditions, developmental characteristics become richer and more varied. These results are often interpreted in terms of achievement by learning. It is nearly impossible to separate one from the other.

Our knowledge of learning ability, in a field as complex and difficult as the arts, is very small. The simplification of learning situations, until they are reduced to a state where results show clearly and are no longer ambiguous, often confuses the situation, since the crux of the matter, that is, the composite of abilities which differentiate skill from craft and craft from art, is lost in the process. We find ourselves facing a situation which, true enough, has been simplified to the extent that we can experiment with it, but we also must be aware of the fact that this simplification has changed the nature of the problem.

The establishment of norms for the drawing performance of children at given age-levels offers little information regarding learning ability. In comparing the various age-levels, we can see some influence on techniques, such as treatment of colors, areas or perhaps arrangement on the page, which can be traced back to planned instruction. Yet, there is not enough evidence to prove such influence. The influence of teachers is only part of the instruction—and often a very small part—which the child picks up and works out. Furthermore, learning by indirect means such as observation of surroundings, contemplation of works of art of any kind (including advertisements, magazine illustrations and the like) and of the process of drawing by others (for instance, more talented school-mates) is probably a more influential factor than planned art instruction, especially so for children up to Senior High School age.

2. *Experimental Investigation of Learning Abilities (Machinery Experiment)*

Therefore we made an attempt at investigating learning abilities in art. We used a directed stimulus situation which also contained a certain amount of instruction. Children were asked to make a pencil drawing of machinery. They were given, verbally, some examples of the meaning of the word "machinery." After completion of the drawing the children were shown a number of picture slides representing machinery, with verbal comments on the slides. A week later they were asked to draw the same subject and given a choice of two media and paper sizes.[17]

An investigation of this kind does not penetrate the subject deeply. It is on the surface and can be best described as a tentative orientation concerning some of the influential factors which are necessary in planned instruction and those qualities in drawing which are apparently open to change through stimulation.

From the results of this experiment we were able to draw the following conclusions:

a. The subject interest of younger children is little influenced by a stimulus situation and

[17] Lark-Horovitz, Betty. "On Learning Abilities of Children as Recorded in a Drawing Experiment", *Journal of Experimental Education*, IX, 4, 1941, pp. 332–360.

if so only within an existing sphere of interest. Older Average children are more readily influenced while Specials show a distinctive response (63% of responses of the Specials as compared to 19% of the Averages).

b. *Preference* or liking within the limits which the stimulus situation offers (in this case lantern slides of pictures) is less apt than other factors to create a change of attitude. Our results here are only an indication of this fact. Once this can be proved in large enough numbers, in a variety of situations and with different materials, this result will be of great importance educationally, since it runs contrary to the assumption frequent among teachers (perhaps because of misinterpretation of Dewey's teachings) that preference for a subject, materials or a medium is necessary to the promotion of learning. Esther M. Sills[18] came to the same conclusion while conducting an experimental class and states that "the use of material which the child positively dislikes is a powerful stimulus to successful creative production, and to the extension of critical appreciation . . .", and that the class's initial unfavorable attitude toward an expressionistic art exhibit proved to be more stimulating, because controversial, than the enthusiastic attitude toward other material.

c. The *representational* status of the child, e.g. as schematic or mixed, is not changed by the stimulus situation. Some very slight differences in second drawings show regression, to be attributed in this case to the change from a familiar to an unfamiliar medium.

d. In the cases where the picture slides of the stimulus situation were instrumental in the *change of content* of the second drawing, the changed content was represented by means of the very same kind of picture organization and technique that prevailed in the first drawing. That is, the objects in the drawing and their distribution on the page pointed to the slide which had influenced the child; but no other characteristics, such as contrasts, black-and-white treatment and the like, were adopted.

e. The introduction of a *new medium* in the repeat drawings showed that younger children are more apt to try something new than the older ones, and Specials far more so than Averages (also far more than younger children). But no influence of picture slides on technique in the second drawing could be noticed. Whether the superior handling of the new medium by the Specials was due to their superior ability in general or to the application of some observations made during the stimulus situation (from the picture slides or the explanatory comments) remains open to question.

f. We can interpret the nature of the response to the picture slides, as shown by younger and older *Average children* (comparatively slight as it may be) as *different from* that of the *Specials*. Whereas the Average tries to copy the content and arrangement of the influencing picture by enumerating most of what impressed him without stress or emphasis on a single factor, the Special omits or emphasizes certain aspects and, through design, composition, distortion or specific treatment of his own drawings suggests the influence of more general and subtle concepts transmitted through the stimulus situation. Thus, the Special responds more in terms of his expressive means, while the Average responds more in terms of subject-matter interest, translated perforce into a graphic medium.

3. *Comparison with Results of Art Appreciation Studies*

In our Art Appreciation Studies we found signs of an indirect way of learning by looking at art objects which support the statements just made. The Specials' attitude toward the picture or pattern is *analytical*, with less attention than the Average to the content, rather with special attention to design, color and whatever they can gather for application to their own work. They are more interested in the *means* which create an illusion than in the success of the *illusion*, as are the Averages.

Close to the matter of learning ability of children are the problems of planned instruction, curriculum construction and educational objectives. If we had more knowledge of children's learning ability by age levels, we would be in a better position to set definite objectives, to build up a curriculum of planned instruction and to discuss the means by which to achieve the best results.

One way of approaching learning ability is by experimenting with specific problems such as the one discussed above. Another ap-

[18] Esther M. Sills, "An Experiment in Introducing Children to the Use of Museum Collections", Manuscript, The Cleveland Museum of Art, 1939–40.

proach is that of evaluating the usefulness of teaching materials and of teaching results by means of children's reactions, their achievement and their changes of attitude.

4. Evaluation of Progress of Student

The evaluation of the progress of students depends on the kind of criteria used in relation to specific teaching methods and objectives of given schools.

a. Criterion in evaluating progress. Students' progress at any age level can be checked by repeat tests. These may work in two ways. We can use them for comparison of various achievements of an individual child and without comparing them with the achievements of other children, or we can use them in connection with ranking: that is, comparison of the achievements of the various children within a group and comparison with the norms of the given age level.

Through our 'Analysis' (see section IIA above) we were able to establish age-level norms for a large number of art characteristics. Drawings may be analyzed at time intervals during the school year, and thus the progress of the individual can be checked.

b. Use of repeat tests; the Diagnosis. In order to facilitate the use of an objective evaluation of this kind, and in order to eliminate the personal judgment of teachers, a great part of the 'Analysis' was used for the construction of a diagnosis of children's drawings, a kind of teachers' manual.[19]

The *Diagnosis* offers check sheets for each age-level on which the characteristics of a drawing, whether considered as desirable or as undesirable, are marked. The marks are made on a square which indicates the normal occurrence of a quality on a 1% to 100% scale. Thus they show whether a characteristic is typical or atypical for the age level in question. A summary lists the characteristics and facilitates an interpretation of results of the *Diagnosis* in terms of 'average', 'under-average', and 'over-average'. In order to secure correct markings of the various characteristics, every trait is defined and illustrated. The *Diagnosis* contains a 'Rationale'[20] of characteristics, instructions for testing and checking, and a table of the norms on which the checking forms are based.

[19] Lark-Horovitz, Barnhart and Sills, *Graphic Work-Sample Diagnosis, an Analytic Method of Estimating Children's Drawing Ability*, The Cleveland Museum of Art, 1939.

[20] That is, explanation and description of the principles on which the characteristics are treated and normalized.

Since this method of judging children's drawings was different from others such as completion tests or evaluation by judges, it seemed advisable to find out whether the *Diagnosis* could be of immediate use to teachers, and whether the factual knowledge on which it is based, as well as the terminology of the definitions, was familiar to them or not. We therefore asked a number of art teachers of high standing to cooperate in this matter and take the necessary time and trouble for trying out this new device in evaluation.[21] Nineteen teachers (of eleven schools) cooperated in this task. One hundred and ninety-four sheets were returned for rechecking. Comparison of our checks and the teachers' checks showed a very large number of checking errors. From the kind of errors and the answers to a criticism questionnaire which we sent out to the same teachers we came to the conclusion that teachers in general are unfamiliar with the concept of norms and developmental levels, that checking of art characteristics in accordance with definitions necessitates training, and that some teachers doubt seriously the purpose and applicability of any evaluative device in art.

c. Use of record sheets. In order to learn whether art evaluation is possible without reference to age-level norms or without reference to achievements within a group, we devised an *Art Project Analysis Record Sheet* for teachers and students,[22] which was to be kept by teachers[23] and students during one semester and which was to be used for every individual project. Art, in the Shaker High School, is taught more or less individually, though students assemble in a group at a given time for art class. Hence every student works on a project of his own, which involves simultaneous use of different media and different numbers of projects per student. This progressive school is, therefore, interested in evaluation which estimates the progress of the individual without definite reference to his fellow students. Thus the achievements of a student can only be compared with his own past achievements and progress, ex-

[21] We wish to thank especially Dr. Ralph Tyler, Chicago University, and Dr. Paul Diederich of the Progressive Educational Association, Chicago, for their cooperation and advice in this matter, and all the teachers who so kindly gave their help and time in this matter.

[22] For Record Sheet Forms, see Appendix I and II.

[23] Miss Mabel Ely and Miss Jean Corser of Shaker Heights High Schools as well as the teachers on their staff have cooperated with us in this and other experiments. We wish to thank them for their understanding, help and liberality in giving so much of their time.

pressed accordingly with reference to a first, initial achievement and later achievements.

By comparing three, four or more record sheets of an individual student we hoped to find indications of progress. Since attitude and various stages and qualities of the project had to be checked, we devised two record sheets, one to be answered by the teacher, the other by the student. Thus, discrepancies of opinion and of judgment could be checked. Comparison with other children's work was ruled out.

Although the analysis of these record sheets brought some interesting results of a general nature,[24] they revealed nothing specific in regard to the actual art progress of the student or any particular characteristics.

In other words the outcome of the record sheets showed that intelligent evaluation without explicit criteria is not possible, even if semi-objective statements are accepted. The record sheets are elaborate subjective statements of students' and teachers' opinions concerning the student's art projects, his attitude and final achievement. On the other hand, teachers and students alike, but especially teachers, considered the use of such detailed record sheets as a kind of guide which clarified their own ideas regarding characteristics and aims of each project and which therefore was helpful in teaching and judging the student.

From the preceding we are forced to conclude that if schools wish to evaluate their students' progress, they must accept the use of definite criteria and, where necessary, establish criteria; or that schools which believe that comparison of one student's work with that of another or comparison of the work of a whole group with standardized norms (see 'Analysis') is harmful, must waive an objective evaluation of progress and rely on their teachers' personal judgments.

C. Art Materials, Including Media for Production and Works of Art for Study

1. Relation of Medium to Developmental Stage: the "Recorder"

We have mentioned earlier that all children represent their objects in outline. It is an established fact that children color their outlines in a manner similar to medieval manuscript illumination, unless they are directly taught a different procedure. Even so, in spite of planned teaching, they tend to revert to their own technique of representation.

In our 'Analysis', the drawings showed that children used a pencil to make their outlines, and that children who had no pencils used crayons in order to make an outline first, before using them for coloring purposes. These findings are sustained by observations made by E. N. Barnhart[25] while using his device called the "recorder". This instrument records the various phases which lead to the completion of a drawing. Of the 20 children who drew schematic pictures, he reports that "the usual practice was to draw outlines in pencil and to use crayon for the real filling-in. Often the outlines would be drawn in crayon over the pencil. In drawing the figure, the head outline was made first in most cases, followed by the body and then the legs and arms. Then a return was made in the details of the face and head: the eyes, mouth, ears and, sometimes, hair. Then other bodily details were put on at the end, if indeed they were present at all. When all the details had been added and the outline finished, the inner surfaces were colored over in a flat uniform color."

Aside from a very few exceptions, it is evident that children, even in their most colorful pictures, do not paint; rather, they make colored drawings. In other words, outlines are essential, a primary necessity; the coloring is an attribute of secondary importance.

Therefore, we can say that an adequate medium for children is that which permits the technique of outlining, contouring or shaping as a skeletal procedure for anything to follow, such as coloring or decorating. On the other hand, media which stress an impressionistic, contourless technique are contrary to the developmental pattern, and thus, in the course of time, prove to be an obstruction to development and learning.

Learning cannot be understood apart from development. Learning is most successful where the natural developmental direction is used as the main body from which to start. Thus, guidance and instruction must keep within the developmental pattern, yet must enrich it and build it up to full capacity, and therefore avoid the attainment of objectives

[24] Comparison of teachers' and students' sheets showed, for instance, that the student judges his own attitude toward learning, the suggestions of his teacher or the outcome of his art project very much as does his teacher. In other words, students and teachers in this school must work together very harmoniously; otherwise differences of opinion would show on various questions.

[25] See page 157.

which block development. This is especially true of the use of media and techniques in children's art production.

2. Routine Technique of Familiar Media

In their drawings children frequently evolve a routine technique for any medium which they use often enough. Thus, pencils or any pointed tools are very serviceable for contour techniques. The pencil or crayon also provides for filled-in or graded areas.

When children are asked to change from one medium to another, we find that they do not adapt their subject treatment thoroughly to the new medium. On the contrary, they attempt to use the new medium much as if it were the old, familiar one.

3. Introduction of New Medium; Results

In our experiment regarding learning abilities of children, children were offered for their repeat drawing the use of a new medium (pen, brush and ink) in addition to their former one (pencil) and a second (larger) paper size. A comparatively small number of the older average children availed themselves of the opportunity of trying a new medium (23%). About half of the younger children (46%) and nearly all Specials (93%) did so. Change of medium involves a change of technique. Comparison of the first and second drawings of each individual who changed to the new medium shows that the greater number of average children, younger and older, is unsuccessful; and that, in a small number of cases, the change of medium reacted even on the developmental status, producing regression. The group of Specials parallels that of the Averages in that it is also less successful in using the new medium. But its lack of success is relative only, while that of the Averages amounts to complete failure.

The younger, and to some extent, the older Averages attempted to apply their pencil technique of contour, grading or cross-hatching to the brush-ink technique and thus met with disastrous results, while the Specials changed their technique and tried to work out something new. Their relative failure, therefore, is attributable to lack of experience and practice in the new technique, and not—as in the case of the Averages—to a misunderstanding of the nature of the new medium.

4. Use of Pictures and Art Objects in Productive Activities

Museum materials, such as current exhibits, picture reproductions, prints or other art objects are used in the various art classes given at the Cleveland Museum of Art. In order to keep careful records of lessons, materials and children's reactions, an experimental class was conducted by Esther M. Sills at the Cleveland Museum of Art.[26] She interprets her results by stating that: "1. Lessons using exhibit materials seem to be more successful with average children than lessons without . . . and the drawing product better . . . 'Free' lessons were, on the whole, unsuccessful. 2. . . . certain children whose imagination and technical facility leads us to call them especially gifted, revel in lessons where imaginative self-expression or technical skill is the goal, and in which there is *no* exhibit material. 3. The use of material which the child positively dislikes is a powerful stimulus to successful creative production, and to the extension of critical appreciation *if* the material is presented in such a way as to help the child understand the artist's purpose. 4. . . . the characteristic adolescent craving for realism may be partially diluted through explanation of the aims underlying non-realistic art, and understanding may be clinched through the child's attempt to express himself non-realistically. 5. The response to presentation of isolated factors such as line, color and third dimension is uneven . . . response to depth was enthusiastic when applied in drawing. 6. Comparison of the responses of boys and girls show some sex differences. On the whole the girls show more decorative traits than the boys, using more brilliant colors, more . . . repetition . . . lines and the like. The boys, however, adapt themselves to new materials more readily than the girls . . . With specially gifted children these differences are lessened but not eliminated."

Among these conclusions attention must be drawn especially to statements 1, 3, 4, and 5. Many teachers are now in full agreement with the first statement, but very few teachers, if any, are inclined to put into practice the statement condensed in 3, which sustains the interpretation of some results of the learning ability experiment discussed above.

[26] Esther M. Sills, "An Experiment in Introducing Children to the Use of Museum Collections." In manuscript, The Cleveland Museum of Art, 1938–39.

D. Various Factors in Children's Productive Art Activity

1. Intelligence

Art is considered in many schools, especially on the high school level, as one of the few accomplishments which students can attain who otherwise have poor grades and are of lower intelligence. In order to find out whether there exists a direct relationship between intelligence and drawing ability or between intelligence and accelerated representational development—one of the outstanding characteristics of specially able children—we have calculated the mean I.Q.'s[27] per age level and sex, and per Special and Average Group, of all those children whose drawings were made in 1936–38 and evaluated through our 'Analysis'. (The total number of children included: Averages, 781; Specials, 70.) We have furthermore calculated the mean I.Q.'s of the age levels and sexes grouped according to their representational development, and also given due consideration to the range in intelligence within each age-level. We thus can see that the specially gifted children's mean I.Q. is higher than that of the average children of the same age-level, but that the difference is neither excessive nor constant. We see furthermore that the average deviation from the mean—determined by the range in I.Q.'s—does not differ appreciably between Averages and Specials.

However, the mean I.Q. of the 70 Specials as a group is relatively high—113.2; their range is about the same as among Average groups, about 80 to 142, and therefore their A.D. is also not different—11.4.

There is no doubt that most of the age-levels in the Cleveland Museum of Art—all of whom served as subjects in our experiments—have a higher mean I.Q. than is found in public schools. For this reason the mean I.Q.'s of the Special group and of the C.M.A. Average groups do not seem to differ greatly.

In other words, the Specials as a group are an intelligent group, yet there are higher individual I.Q.'s among our Average groups. Some of the average age-levels used in the 'Analysis' were exceptionally high, such as the 15-year-old boys (mean I. Q. 112.1) or the 12-year-old girls (mean I.Q. 106). The fact that the Specials as a group are of good intelligence defeats the assumption that art is especially suited to students of low intelligence, since they will also remain in art on a low or average level. The confusion in this case is caused either by the lack of evaluation of poor students' art achievements, or by teachers' indifference concerning their art achievement, or both.

When we compare the mean I.Q. of children according to their representational stage, we find that children up to 10 and 11, who are in the mixed or true-to-appearance stages—that is, children who have an accelerated developmental status as compared to the rest of the group—have a higher mean I.Q. (See Graph VII for distribution of mean I.Q.'s in relation to developmental status.) From age levels 12 and 13 on this proportion grows smaller; that is, fewer children with a higher I.Q. have an accelerated representational development. Among the girls age-levels 14 and 15 seem to reverse the proportion, since the average I.Q. of those girls who draw in a true-to-appearance way is below the mean I.Q. of the group.

The schematic stage prevails up to and including age-level 11. Children who show an accelerated development are exceptional since their number is small. The mean I.Q. of this small number is distinctly above that of the group. On the other hand, an accelerated representational development (true-to-appearance) of older children after the age of 13 is relatively less exceptional since far more children have reached the mixed or true-to-appearance stage. Their mean I.Q. is slightly higher than that of the average group (and in the case of the girls slightly lower). The few cases that can be called exceptional (because they draw in perspective, a developmental step further than true-to-appearance) have a higher mean I.Q. than the group.

Therefore we are justified in an interpretation which couples accelerated representational development with higher intelligence. Thus we can say that I.Q. is positively, though not highly, correlated with productive art capacity, and that intelligence is a factor of considerable influence in successful productive art activity.

2. Originality of Ideas, Fantasy, in Connection with Graphic Representation; Story Completion

Originality and fantasy are two other factors which, on the surface, would seem important in art production. In order to inves-

[27] Since it has not been possible to secure the same kind of intelligence tests for all children, we were forced to include both individual test and group test ratings.

tigate these more closely, a story completion problem was given, the completion to be presented in the form of a drawing. To the younger children (6 to 9) a fairy tale was read up to a certain climax and they were asked to draw a picture of how the story ended. To the older children (10 to 15 years old, Averages and Specials), two news stories were read, the one reporting an astronomical incident, the other describing an expedition which set out to investigate the astronomical incident. The completion drawings were supposed to furnish a picture of what the expedition found when it arrived on the scene.

Fifteen per cent of the younger group and 14% of the older one missed the problem in that they pictured a part of the story that had been read to them.

The majority of the younger children supplemented their completion verbally. Though they reached a solution they were unable to give a successful graphic representation of it. A minority introduced atmospheric effects in order to characterize the general mood of the story. Very few drawings were fantastic or unusual in shape, color or action.

Most of the older children reached a solution by depicting some strange objects, as was to be expected from the strangeness of the news story. The Special children's solutions were similar to those of the Averages. Three per cent only of each group, Average and Special, presented a "fanciful" solution.

In general the drawings of the Specials were more rich and explicit in their content than the Averages'. Only one-third of the Average group indicated moods or specific effects, while one-half of the Specials did so.

On the whole, little originality and fancy was shown in the completion drawings of all groups—younger, older Average or Special group. Originality and ability in representing it pictorially did not correlate.

However, the present form of this experiment is inconclusive because of faulty formulation of the problem in regard to the objective (originality of idea); it could be improved and bring more conclusive results. It would be premature to decide whether originality of ideas is an irrelevant factor in special visual ability or whether originality of ideas differs per age-level; in which case its nature must first be ascertained in this connection.

3. Width and Facility of Graphic Vocabulary in Relation to Expression of Ideas

Another of the various factors responsible for productivity and ability in art is the width and facility of the graphic vocabulary. In order to represent an idea, a scene or even single objects, certain graphic signs must be mastered and used, whether in the form of schemata or through likeness to nature.

In the 'Analysis' of children's drawings, drawings with four different subjects were evaluated. The evaluation showed that the same child, according to the subject of his picture, differs in the variety of his drawn subjects and in his representational status. The two drawings which gave the child an opportunity to use objects and arrangements which he had drawn before showed the child more versatile and slightly advanced in representational status as compared to the other two drawings, which demanded the representation of a definite subject that left little freedom. Of the latter two, No. 3 ("Make a picture showing just how your classroom looks while the children and the teacher are there") forced the children to introduce at least two factors, in the drawing of which they might not have had any practice previously: 1. The drawing of a room, thus introducing the problem of spatial arrangement; 2. the drawing of a *group* of figures, thus introducing complex units. Analysis of this drawing showed that children whose developmental status had been true-to-appearance or mixed in drawing No. 1 ("Make a picture of whatever you like best to draw") lapsed into the schematic stage in drawing No. 3; that the human figure represented either in detail schematically or true-to-appearance in drawing No. 2 ("Draw a picture of a man"), was presented in No. 3 either without details or in a more primitive schema, or again schematically. In other words, a regression in representational status occurred when the drawing subject, the object which formed its content, or their arrangement, were unfamiliar.[28] A similar occurrence was noticeable in the learning experiment discussed above. The new medium and the unfamiliar subject caused a slight regression of developmental status.

[28] The number of drawings on which the "Analysis" is based was originally seven; evaluation of Nos. 6 and 7 remained incomplete and hence was not included. No. 7, the drawing of a horse from a moving picture, shows the regression discussed here much more obviously. Most children, in drawing the horse, showed a still greater lapse in developmental status than they had shown in drawing No. 3.

Free expression in drawing calls for a certain width and facility of graphic vocabulary. The 'Analysis' pointed to the fact that a free choice of subject such as allowed in drawing No. 1 or partly in drawing No. 4, is hampered by the impossibility of representing certain objects or situations to the child's own satisfaction. The knowledge of how to represent a wide variety of objects, and ease in doing so, contribute to expression. We found, for instance, that the Specials in their drawings of machinery (Learning Ability Experiment) handled a far greater variety of subjects than did the Averages. This was due, no doubt, to their ability in representing them, and not to greater variety and originality of ideas.

In a Memory Experiment[29] undertaken for the purpose of comparing the relation of a number of objects that are remembered with the ones used in drawing, a group of Average and Special children (12, 13 and 14 years old) were asked to make a written "list of the things they had seen, heard, felt, smelled, and tasted on the way to the Museum" on the morning of the experiment. After making the list they were asked "to select something from their list and make a drawing of it". Of the items listed, 85% were predominantly of a visual nature. The written lists of the Average children did not differ in numbers of items or terminology from those of the Special group. Yet the drawings of the Specials differed substantially from those of the Averages in that they chose from their list items more adaptable to graphic representation and then made a picture, the composition of which, its variety of objects and variation of representation, showed that their width and facility of graphic vocabulary was far greater than that of the average group.

4. *Visual Memory—a Vital Factor in Graphic Expression*

The number of objects which Specials are able to represent, and the assuredness with which they handle details or pictorial arrangement, lead to the assumption that Specials may have a kind, intensity or length of span of visual memory which average children do not have and which is instrumental in their acquisition of a graphic vocabulary.

[29] Esther M. Sills, "Memory Selection Experiment", Manuscript, Cleveland Museum of Art, 1938.

In order to investigate the visual memory of children, a repeat experiment[30] was made in which a ceramic statuette of a polar bear was placed on a rotating base. The base revolved slowly, thus showing the bear ceramic from all angles. After a few minutes, the bear was removed. Directly after, the children were asked to draw the bear. An hour later, the children were asked to repeat the drawing, and the same request was made after a week, three months, a year and two years. At the time of the sixth repetition, only a few children who had started in this experiment were still present. The main objective of the repeats was observation of changes between the first and subsequent drawings, their nature, and comparison of the Average and Special groups in this respect.

The repeat drawings of a number of children, both Specials and Averages, appear to be identical or nearly identical. The identity covers position and general shape of the bear, technique of treatment, or both. In all except identity of line treatment, there are more Specials with identical or near-identical drawings. Seventy-four percent of the Averages, and 93% of the Specials keep the same bear position, e.g. side view or three-quarter view, during three or more repeats.

Regarding the progressive exaggeration or leveling out of characteristics and details, we find that only 13% of the Averages progressively exaggerate characteristic parts compared to 30% of the Specials; and that 43% of the Averages level out characteristics compared to 51% of the Specials. In other words, though Specials progressively exaggerate characteristics twice as much as Averages, that is, qualities which enhance the bearlikeness or movement or ceramic quality, they also tend to level out such characteristics more than Averages. If we compare the number of drawings of Averages that never had *any* bearlike quality (36%) with that of Specials (6%) and those that had such qualities in one drawing only (Averages 29%, Specials 6%), we see that only one-third of the Averages had drawings in which characteristics could be exaggerated or leveled out, while 7/8 of the Specials' drawings possessed such qualities.

Although the bear ceramic was white and had the smoothness and flowing contours

[30] The evaluation of this experiment which included children of the age-levels 6 to 15 is as yet incomplete; therefore the data and the interpretation given here extend only over age-levels 12 to 15, are tentative and subject to change according to further results.

typical of a modern ceramic, some Average children drew black, shaggy bears, 91% drew 'real' bears—often with imagined bear surroundings such as a floating ice block or hilly ground—and only 9% of the Averages attempted to represent a ceramic. Nearly one-fourth of the Specials attempted to draw the ceramic itself.

The original represented a bear in movement. But only eighteen percent of the Average children attempted movement, mostly unsuccessfully, while 40% of the Specials did so and were rather successful.

A high percentage (63%) of the bearlike drawings of the Specials remained unchanged through three repeats, while the bearlikeness of the repeats of the Averages fluctuated.

These results point to two significant differences between Average children and Specials: first, that the visual remembrance of the Specials, directly after seeing the original, is clearer and more specific than that of the Averages; and second, that it remains more permanently. It is probable that first impressions of all kinds of objects on Specials are more definite and lasting than on Averages, which would explain to some extent the greater variety and facility of the Specials' graphic vocabulary. The large number of Specials remembering and rendering the motion is attributable to the same reasons. However, very few Specials remembered and recorded the twist of the neck and upward tilt of the head—two qualities that distinguish this particular ceramic from other, possibly similar bear ceramics. In the drawings of those few Specials who did, these two qualities were the first to be leveled out in 2nd and 3rd repeats and to disappear entirely from later repeats. The far greater number of bearlike drawings of the Specials shows that they are more apt to grasp at once the difference between a bear and some other animal; hence their tendency to exaggerate more than the Averages the bear characteristics.

The interesting fact that so many more Specials remembered and attempted to draw the ceramic quality of the bear, as compared to the few Averages, may be considered as deriving from the same kind of difference in attitude between these two groups which was noticeable in all appreciation experiments: that Specials care far less about the reality of the represented object. It also serves as another proof of the analytical kind of observation of the Specials, which they showed in their picture comments in the Art Appreciation Studies, and in the use which they made of the slides that were shown in the Learning Ability experiment. Here again some of the Specials watch for the form of expression used in representing an object and not for the object itself, while nearly all Averages watch for the object itself and are carried away by the illusion without noticing the means by which the illusion is created.

5. Aesthetic Means Detached from Representational Factors

What are the aesthetic achievements in children's work? This is a crucial problem in investigating children's art abilities, made very complicated by the necessity of detecting and evaluating aesthetic factors apart from representational ones.

a. Aesthetic qualities checked separately in the 'Analysis'. In our 'Analysis' Section III records Aesthetic Means and Techniques. We found that evaluation of aesthetic means and technique could not be separated. But we also found that in drawings such as the four treated in the Analysis, representational qualities and aesthetic and technical qualities, though checked separately, cannot be interpreted separately, because they are closely interrelated and depend on each other.

We have stated above that certain aesthetic characteristics, such as contrasting use of color or thematic unity, are developmental. Others, such as grouping or motion, are constant, while intentional indefiniteness of outline is rare. In doing so we pointed to the fact that certain aesthetic factors are only moderately visible in average children, and that other, rare characteristics can be observed only in the work of a few. In all cases they are incidental to the representational and to the subject matter part of the drawings, and even very careful checking is often difficult and misleading.

b. Difficulty of getting direct aesthetic responses. The rug, a decorated object; analysis by E. N. Barnhart. Because of these difficulties, an analysis of the fifth problem of the original Seven Drawing test ("Make a picture of the most beautiful rug you can imagine") was undertaken separately.[21] This problem had as objective to concentrate chil-

[21] Edward N. Barnhart, "Analysis and Evaluation of Rug Designs from the Seven Drawing Test", 158 pp. in mss., The Cleveland Museum of Art, 1940.

dren's efforts on the purely decorative factors. We shall quote here certain facts revealed by Dr. Barnhart's analysis of the patterns.

There are designs of variously shaped rugs —rectangular, elliptical, and indeterminate. Among these one can distinguish two major types of organization: (a) an extensive type with designs "built on an organizational basis which provides for an infinite extension and repetition;" (b) an intensive type with "designs which are definitely constructed within an area and with reference to it".

"Designs composed of design units or motives . . . are the most frequently created. They increase steadily in frequency up to the age of thirteen . . ."

"Designs composed of lines only are the least frequently chosen of all forms."

"Designs of color areas show a great rise at seven years to a frequency of over 50% but decline rapidly from that year on."

"Of the closed designs" (intensive) "geometric forms are much more frequent than non-geometric, which rise from relatively almost complete absence to 8.1% at 15 years. Naturalistic designs remain at low frequency throughout."

"Of the open designs" (extensive) "all-over patterns remain fairly steady in frequency, but band patterns drop off steadily from a height of 35.9% at eight years. Whole-field color areas are highly infrequent."

In analyzing specific design units it was found that "simple forms of organization are most frequently used with rather simple motives, either geometrical or stylized. With increased age more complex and unsymmetrical forms are used, and non-geometrical forms of organization appear. The use of identical motives decreases, and many designs show the repetition of several different units and also the development of design units as developments or variations of one or more motives."

In regard to relation of design units, it was found that "with increasing age there are more units in designs, related in more complicated ways and placed neatly and symmetrically on all coordinates around a center motive."

"Designs which consist of naturalistically rendered scenes . . . show objects placed in geometrical ways; the logic of their placement is primarily representational. This type of design is fairly frequent."

A "considerable number of designs consisted entirely of a single area of color without motives or design units or lines. The essence of the design then lies in the treatment of the ground, the color surface."

A great number of designs "showed plain color areas (though at later ages they were textured variously) of regular shape in horizontal-vertical dispositions of regular repetitions."

In general it can be stated "that for most children a rug design consists typically of units or design motives on a field, for we find that designs using motives in various forms of organization are most frequent by far. There is little interest in lines alone for their own quality. The use of subdivided color areas is frequent in early years but drops sharply even when we find it combined with motives."

One can attempt a "few generalizations regarding several matters which have been made prominent through the analysis."

"I. There is a tendency for design units to be simple and symmetrical in the early years, to change toward more complex types in midyears and then to become simpler again, but usually of unsymmetrical and non-geometric form around 13 to 15 years."

"II. With increasing age we find that design units tend to be related in their natures in one way or another, rather than being entirely dissimilar."

"III. There is a tendency for the earlier designs to have fewer units. With age the number is increased until the whole field is filled to surfeit. Then at 13 to 15 years there comes a decrease and older designs are, from this point of view, simpler."

"IV. In the early ages colors are put down plainly and simply, often carelessly. With age other ways of treating the surface appear: textural effects, smooth and shiny surfaces or delicate, bright application, etc."

Several of the results of Dr. Barnhart's rug analysis tally with results from other experiments and thus accentuate and strengthen their validity. The fact that band patterns are at a height at age eight and then drop off steadily is a parallel to the bandlike compositional arrangement of the standline during the same (schematic) years. The observation of more complex and unsymmetric forms coupled with non-geometric forms of organization in older children's designs parallels

the growing asymmetry and decreasing object decoration in other drawings of older children. The statement that the geometric placement or arrangement of naturalistically rendered motives primarily follows the logic of representation is consistent with the prevailing fact that children decorate objects in their drawings, for representational purposes, up to age thirteen. It also underlines one of the observations of the Textile Appreciation Study: that is, interpretation of patterns in terms of representation or practical usefulness.

The tendency of younger children toward symmetry and simple design units, and of older children toward asymmetry, is paralleled by similar tendencies at the same age levels in the composition of their drawings. The observation that younger children put down colors "plainly and simply" corresponds to the tendency of these age levels toward multicolored drawings and the repeated use of certain colors because of a preference for them. The preference of some patterns by younger age levels, because of the presence of certain preferred colors, complements this observation.

c. Beautiful page experiment. The rug analysis revealed the fact that the rug was considered so much as an object (it was repeatedly placed in perspective view and sometimes a room was indicated) that the concept of the rug as an object prevailed over the purely abstract-ornamental concept. In order to get a response of a more abstract-ornamental nature and detached from any particular object and patterns connected with it, the 'Beautiful Page' experiment was made, for which the children were given paper and color crayons and directed to "make this piece of plain paper just as beautiful as you can make it".

The younger children (7 to 9) expressed the beautification of the page in four ways (in order of occurrence): 1. by greater decorativeness of their usual subjects; 2. by greater neatness of presentation; 3. by complete filling-out of the given space; 4. by selection of objects (or of the content) for their beauty, e.g. landscape or flowers.

The older average group (13 to 14) expressed their idea of a beautiful page: 1. by greater decorativeness of their usual subjects; 2. by selection of beautiful objects or scenes. Among the latter seascapes and flowers were predominant.

In expressing their concept of the beautiful, the Specials applied highly decorative treatment to usual and unusual scenes, and developed unusual subjects toward the fantastic. Pleasant landscapes and naturalistic flowers, such as were favored by Averages, were avoided. (See Graphs IX and X.)

From these results we were able to conclude that the term 'beautiful' meant for the younger group not so much the subject as treatment of subject. (See Graph IX.) For the older Average group, it meant selection of subject and special treatment of it. For the Specials it meant selection of a subject which would be especially favorable to a decorative treatment and strangeness or unusual kind of subject treated with decorative skill.

In regard to treatment of the subject, it is interesting to compare the norms for certain characteristics as listed in the 'Analysis' with the percentual occurrence of the same characteristics under the conditions of an experiment which stressed the "beautiful". From Graph X we can see that, quite generally, characteristics usually considered undesirable, such as 'ragged' lines or 'inconsistent' use of medium (the medium was the same as in the drawings of the 'Analysis') occur considerably less often, and that, on the other hand, 'rare' qualities, such as bold lines or areas, increase considerably, as does the moderately consistent use of the medium.

Blended, graded and bold areas are nearly non-existent in ordinary Average drawings and rare even among Specials' drawings. The effort of beautifying a page doubled, tripled and multipled the percentual occurrence of these qualities. 'Decorative arrangement', a very rare quality among older Averages, surpasses in this experiment the usual occurrence among Specials, where it remains on a normal level; so does 'thematic development'.

A curious phenomenon is the rise (double) in occurrence of 'Intentional Asymmetry', while symmetrical and near-symmetrical arrangements remain on a normal level, which is rather contrary to expectations and to the idea that symmetry itself contains a decorative element. Apparently symmetrical arrangements as such do not seem as beautiful to children as asymmetrical ones. This and the tendency toward strangeness of subject and treatment point to mystery and the unusual as part of the beautiful.

The all-round higher level of technical achievement, in a problem which pointedly disregards representational elements and thus successfully invites the child to minimize them, makes it highly probable that the difficulties of mastering representation are a hindrance in developing technical and aesthetic qualities. This conclusion is sustained by the smaller rise of percentage of rare qualities in the drawings of the Specials, who have less difficulties with representation and who shift their use of characteristics to fit the problem. Thus the Specials' increase of boldness of lines, smoothness of area, moderate and unusually effective use of medium, decorative arrangement or thematic development, is small or none. On the other hand, they shift from the use of symmetry to asymmetrical arrangements and from intentionally indefinite outlines to clarity of outline.

Hence a comparison of the Average and Special groups in this experiment leads to the conclusion that concentration on aesthetic elements results in an obvious, almost startling general heightening of aesthetic characteristics on the part of Averages, and on the part of Specials in a careful shift or choice of aesthetic means which, under usual conditions (that is, according to norms) are as much or more used than by Averages in this particular experiment. The Averages, under pressure, thus show the degree to which their abilities can rise, while the Specials show their degree of discrimination.

6. Suggestions Regarding Various Devices for Testing, Observing and Recording

The variety of important factors inherent in children's art abilities points to the necessity of various methods and devices which would facilitate testing, observing and recording.

Of the methods which we have developed, that of analysis appears most promising at the present stage of research in art abilities. The 'Analysis' which we carried out satisfied the purpose of establishing age-level norms for children's drawings. Our application of this method and the establishment of norms therefrom was based on four drawings per child and on the population of Greater Cleveland. Thus we cannot claim that our norms are valid for every section of this country, nor can we claim that they may apply to every kind of drawing or art product. To fulfill such a claim drawings must be sampled from all over the country, including rural and urban districts, and a greater variety of drawings per child must be analyzed. The analysis is also incomplete inasmuch as Section I needs evaluation and Sections II and III need enlarging. Even so we would gain comparatively complete information only regarding drawing or painting activities. If we wished to orient ourselves regarding the general status of children's art activities, similar standardized analyses must be made of modeled and built products of various kinds.

However, as a method, the 'Analysis' permits placement and classification of a child's art ability, comparison of progress in general and for particular characteristics. The advantage of such a method lies in the fact that it can be applied to various art problems, as we have used it, for instance, in evaluating the results of the 'Beautiful Page' experiment. In teaching, too, it has the advantage of showing to the art teacher that a certain amount of objective measurement in art can be carried out, and, though we do not claim that it solves the problem of judging and comparing "intangible" qualities in art, it leads us a step nearer. Another advantage of the method is the necessity to have or adopt clear definitions of art terms. With the help of picture examples which display the degree in which certain characteristics occur, e.g. moderately or unusually, we attain a still greater accuracy of description and therefore of evaluation.

The perfection of such a method will be attained when scores can be marked and calculated on the basis of properly weighted characteristics per age-level. When this is achieved, we will have found an art ability quotient similar to the I.Q.

This goal, however, is still remote because of the great difficulty of defining a characteristic and estimating the degree in which it occurs; because of the difficulty of agreement concerning the importance of certain characteristics, and because of the necessity of establishing an interrelation in the simultaneous occurrence of certain characteristics, all of which determine weighting and therefore score-calculation. In the meantime, any device should be welcomed which is helpful as a test or facilitates observation or accurate recording of facts.

III. RESEARCH ON CHILDREN'S APPRECIATION OF ART

BETTY LARK-HOROVITZ

A. ART APPRECIATION STUDIES: THEIR OBJECTIVES

As mentioned above, the results of these studies tallied with the results of research in productive art activities. Four separate art appreciation studies were made.[1] The objectives of these studies were, roughly, the following: (a) knowledge of children's preferences in art; (b) knowledge of the reasons for preferences, by means of free comments and with the help of leading questions; (c) knowledge of differences, if and where they existed, between Average and Special children.

Adult choices of art material were eliminated as much as possible. Material was necessarily limited, but was comparatively extensive at the Cleveland Museum of Art, which opened its library, print and textile collections for our purposes. This permitted a preliminary choice of material by the children before narrowing it down to the number of pieces used in the four studies.

1. Results Common to All Studies

All four studies showed that younger and older children differ in their preferences and that preferences vary according to age levels and sex. Specials and Averages show similar preferences, though not in the same order of rank. Analysis of the reasons for their preferences show that all children are guided primarily by the representative content of the picture or textile patterns, and that the younger and older Average and Special groups are attracted by different contents. Other reasons for preference, arranged in order of importance, are color, emotional associations, realism of representation and technique. Though color is next in importance to subject matter (and ranks highest in the textile pattern study) there is a difference in the kind of color preference between younger and older children. This is significant because, as we pointed out earlier, it corresponds to a change in color use in productive art at the same age levels. Also, with advancing age, the liking for and influence of color diminishes, a parallel to the increase in monochrome drawings of older children.

All through studies I, II, and III, the same kind of differences between Specials and Averages is evident. Though general interests are the same, and certain tendencies, such as color appreciation, similar (though intensified in the Specials), specifically aesthetic interests, such as interest in design and technique, are almost nonexistent in Average children, but comparatively strong in Specials. On the other hand, Averages show a far greater interest in the subject and the realism of its representation than the Specials do.

2. Special Results of Each Study

Study I shows that the preferences are not scattered among the 12 picture subjects but concentrated on a few. Younger boys and girls differ sharply in their picture choices. This occurs to such an extent that, for instance, at the age of seven the most preferred picture of the girls is little noticed by boys, and the most preferred picture of the boys is little noticed by the girls. Older children's preferences do not show this kind of difference. Average and Special children of the same age levels prefer the same group of pictures.

This fact indicates that there is no general or fundamental difference between the groups of Specials and Averages, but that the difference consists in their attitude toward a preferred picture. Though the actual choice is the same, the reasons seem of a different nature. Average children are inclined to take the picture as a starting point for study or information regarding its content, while Special children show a tendency to study and discuss the pictorial qualities. In contrast to the Average children, they are interested in the means that produced the picture and in its distinctive effects.

Study II showed the interesting fact of the almost exclusive interest of boys in men's portraits, of girls in women's and children's portraits and of both in younger persons' portraits. Special boys and girls, on the other hand, are interested in portraits regardless of the age of the portrayed person and regardless of his sex. This alone is a significant difference. It shows—together with other indications—that both younger and older Average children identify themselves with the portrait

[1] Lark-Horovitz, Betty, "On Art Appreciation of Children: I. Preference of Picture Subjects in General," *Journal of Educational Research*, XXXI, 1937, pp. 136–137; II. "Portrait Preference Study", *Journal of Educational Research*, XXXI, 1938, p. 598; III. "Textile Pattern Preference Study", *J. Ed. Res.* XXXIII, 1939, p. 35; IV. "Comparative Study of White and Negro Children, 13 to 15 Years Old," *J. Ed. Res.* XXXIII, 1939, p. 258.

which they admire and which, according to a given age level, represents their type of hero and heroine. Younger children restrict this identification to the hero's imaginary activity, which is indicated by the attributes by which he is surrounded or by his clothes, e.g., military insignia or jeweled costume. Older children identify themselves with the character of the portrait, which they interpret through his facial expression. They wish to look like the person in the portrait.

However, the Specials have not the strong tendency toward identification which is characteristic of the Averages. Their interest and preference extends to portraits of older people, to the technique in which the drawing or painting is made, or to certain aspects of design.

In this study a noticeable percentage of uncolored portraits[2] was introduced for the purpose of studying the role of color in appreciation. Color was of greater importance to younger than to older children, as indicated by preferences for uncolored pictures and answers to questionnaires. The decline of interest in color is characteristic for both Average and Special children.

As in Study I the Specials showed a marked interest in techniques and in design qualities.

Study III showed that older children and noticeably Specials prefer modern patterns to patterns of the past and that they indicate by their answers a conscious partiality towards modernism. Both in choice and reasons for choice there is a more decided difference between Averages and Specials than in Studies I and II, and a stronger accent, on the part of the Specials, on the important aesthetic qualities of the pattern, such as technique, line and shape, texture or originality. Averages interpret their choices in terms of general, personal or associative qualities and practical use of the patterned textile.

In this study the Specials give a greater number and variety of reasons than Averages. Their interest in color, arrangement and subject matter is lower than that of the Average children; their interest in texture is higher.

Among their reasons for preference, the younger children not only mention bright, clear colors but favorite colors. Among the latter red, blue and pink figure over 50% at age levels 6 to 9. Older children prefer delicate and subdued colors to bright and many colors, the Specials still more so than the Averages.

Geometrical, abstract patterns are far less favored than patterns with some kind of flower or animal motif. This is interesting in the light of our 'Rug' and 'Beautiful Page' experiments. Explanations indicate that some of the favored abstract patterns are favored because of their color and modernism. Modernism is much more favored by Specials than by Averages. Their partiality seems quite conscious.

Study IV investigates the preferences and reasons for preference of the three other studies in regard to 13 to 15-year-old Negro children. White and Negro children show similarity of choice only concerning the textile patterns. In Subject and Portrait Preference Negro children differ from white ones. Color and subject seem far more important to Negro children than to white ones. However, since a comparison of median and range of P.L.R. of the white and Negro children shows that the white children are 25 points higher than the Negro children,[3] the difference in response may be due to difference in mental development and not to any racial difference.

3. *Educational Interpretation of Results and Possible Practical Application*

In regard to teaching, the results of these studies may serve as indicators in three directions.

1. The chosen pictures give children's preferences, and thus indicate what kind of pictures are likely to arouse their interest, especially if the teacher wishes to use preferences (likings) as a starting point. This is especially important at high school levels, where art interest ranks low among other more dominant interests, especially of boys.

2. The reasons given by children for their preference indicate clearly that the general dominating interests concerning subject and technical matters or emotions (introspective interpretation) at a given age level can be used as starting points for art interpretation and appreciation. In other words, not every kind of art is appropriate for children, nor that which adults may choose through some

[2] These were not uncolored reproductions of color originals but facsimiles of drawings—pencil or charcoal—and large photographs of sculptures.

[3] Probable Learning Rate, computed from group tests used in Cleveland schools: Negroes' median—83, Whites'—108.

reasoning of their own, but the kind of art indicated by children through their preferences at given age levels.

3. The attitude of the Specials may serve as guidance to the teacher in his demands on the quality of art interest and understanding. Specials do not differ greatly in their general development, ability and interests, but they do differ in respect to art. In that respect they can be looked upon as representing a standard of appreciation which is not entirely foreign to average children (as adult art standards are) and to which average children may be led through proper guidance. In other words, the Specials' kind of appreciation can be considered as an objective of any curriculum intended for Averages.

B. Evaluation of Art Material in Promoting Appreciation

1. Museum Ceramic Exhibit Used by Museum Children; Discussion of Results

An experiment was made in regard to art teaching material at the Cleveland Museum of Art,[4] for the purpose of evaluating some of this institution's material, which is used in circulating exhibits in schools. This experiment was made mainly for orientation and for the purpose of having the children's own, sincere opinions. Hence, we did not ask for names and thus cannot distinguish between Special and Average children.

The age-levels participating in the experiment were 12 to 15 and over. The material which the children were asked to discuss and comment on consisted of 14 small ceramics, three of which constituted a single group, and a few of which had more than one color. Since no question was asked concerning preference for the one or other object, likes and dislikes were recorded indirectly (by analysis of comments) and related to the number of comments per object.

One can see that likes or dislikes do not increase or decrease significantly the attention paid to the art objects. For example, object No. 9 shows the greatest number of comments (15%), and No. 14 the next greatest (11%); yet No. 9 is most often mentioned as "liked" while No. 14 is most "disliked". This result sustains the conclusions from our learning experiment (see pp. 125–126) that non-preferred art objects may be as stimulating as preferred ones, or more so.

The comments could be divided into several groups, as shown in Graphs XI and XII. Here again, the results substantiate those of the art appreciation studies, inasmuch as children's interpretation of the exhibited objects in terms of subject matter (that is, relating to the physical character or imagined qualities of the objects, emotional response or pure description) exceed by far any interpretations in terms of aesthetic qualities. Another result supporting those of the art appreciation studies is the number of comments emphasizing reality and clarity, and the lack of comments on any other style of representation.

The conclusions reached through study of the opinions of the 150 children who participated point to the use to which this kind of teaching material is put by the children themselves when they are exposed to it without further explanation. Thus, children of high school age react first to the represented objects themselves, second, use them either as nuclei for associations and fantasies or respond to them emotionally, and last, look at them as objects worthy of description. Their existence as art objects is little noticed or valued; it is a by-product. For teachers this information is important because it points to the necessity of discussing the aesthetic nature of these objects (besides exposing the children to them without comment) if art appreciation is to be a teaching objective. It remains to be seen how effective an interpretation of aesthetic qualities can be and how lasting as long as subject matter is so dominant.

Another valuable result of this study and further evidence of the subject matter interest (non-aesthetic) in art objects can be found in the children's suggestions. There we find a comparatively large percentage of children expressing the wish for types of art other than that shown, and a still larger percentage wishing for greater variety of subjects; also the opinion of some of them concerning the fitness of such an exhibit for their own school or their opinion regarding the attitude of other (absent) children regarding exhibits of this kind.

[4] Division of Circulating Exhibits (Mrs. Ruth F. Ruggles, Supervisor). This experiment was related to a grant of the General Education Board, New York, for experimentation with visual material in secondary schools.

2. Museum Ceramic Exhibit Used in School; General Effect of Exhibit Material on Three Groups

The collection of ceramics described above was exhibited in one of the high schools[5] without any comments on the part of the teachers. Three different groups of students, one taking Elective Art, one taking the New Curriculum course of Creative Arts, and one taking English, participated in an experiment in which the students were asked to give their comments in any literary form they might choose, such as poem, short story, critique, newspaper report, or the like.

An analysis was made of the form in which the comments were written up, and of the kind of comments, indicating the interests and interpretations of the students. All write-ups showed a number of comments. However, most of them accentuated some one principal interest. Hence we distinguished between the total of responses and *main* (primary) responses. Therefore, some qualities are noticed and commented on very frequently, while others (those marked as "main" comments) are of greater importance to the student, but are less often mentioned. Graphs XI and XII show rather complex distinctions between 'interpretation of qualities of the object' as representing an aesthetic achievement, an interesting subject, or some emotion, and interpretation of the object in terms of emotional associations caused by the ceramic object's representational qualities, its subject or its aesthetic qualities. These distinctions were necessary, since merging of the two groups would be absolutely misleading, as can be seen by the relative scarcity of comments on the qualities which the ceramic embodied and the great amount of comments describing emotional associations stimulated in the student or in other people. The first group ascribed to the ceramic object the qualities just mentioned; the second group ascribed to a person certain emotions which some quality of the ceramic arouses.

The student group (numbering 30) who took Elective Art also took English, but not the Creative Arts course. The English group (numbering 30) did not take Elective Art, but some took the Creative Arts course. The Creative Arts course group (numbering 23) did not take Elective Art. There was also a fourth group of nine students which, at the time of the exhibit, was engaged in modeling and which was included for this reason.

Results show some similarities of interest and appreciation between the Elective Art and English groups, such as interpretation of the object in terms of emotional associations caused by representational qualities, or interest in color and brightness (aesthetic quality), or the form in which the comment was written (critique). The Creative Arts group and the English group show more similarity of interests and interpretation, such as in the interpretation of the ceramic in terms of emotional associations caused by its subject (82% and 67% general comments; 65% and 43% main comments). This kind of interpretation thus occurs most often and represents the largest percentage of main interests. The English group is the only one in which 43% of the students expressed direct dislike of some of the objects of the exhibit.

Regarding the indications for preference among the exhibited ceramic objects, all three groups prefer one ceramic (No. 9—The Immigrants), the English group most of all (65%), while the Creative Arts group concentrates one-third of its preferences on it and scatters two-thirds of its preferences on five other objects, four of which are similar in style, movement, finish and color, representing musicians and dancers. Therefore one could almost say that the Creative Arts group divided its preferences between the "Immigrant" ceramic and the group of four similar ceramics. The Elective Art group differs in that it has a second concentration of preferences (on the group of three pieces, No. 2) and that the other 50% of likes are scattered among all the other ceramics.

Regarding the various aesthetic qualities, one can observe a great variety of comments, mostly of secondary importance to the student. The Elective Art group, however, offers more than twice as many comments and concentrates on technique (27% of their main interest).

According to these results there exists a difference of interest, observation and interpretation between Elective Art students and non-art students. There is more likeness of interests and interpretations between the Creative Arts group and the English group (non-art) which would point to the possibility

[5] The school which used this exhibit and which has cooperated closely with the Cleveland Museum in various experiments is the Shaker High School, Shaker Heights, Ohio. We extend cordial thanks for cooperation to its principal and staff.

that literary interests in the former prevail over visual arts interests.

The comments of group four, which cannot be compared on an equal basis with the others because it consists of a few students only, point to no main observations or interests connected with the activity (modeling) in which it was engaged at the time. However, the number of comments on aesthetic qualities is proportionately higher than even that of the Selective Art students.

The conclusions which we are entitled to draw from these differences are that Elective Art students (and art students group IV), either because of inherent interest in art or because of previous teaching, are more interested than other students in aesthetic qualities in general, and center a great part of their main interest on aesthetic qualities, while this is not so with the other two groups, which center their main interest on emotional associations. The group of Creative Arts students shares various interests with the Elective Art and English students. That is, it can be regarded as having some of the outlook of the Elective Art student and some of the non-art student, while the English students seem most removed from visual arts interests.

3. Museum Print Collection Used in Same School

In order to observe the reaction of the same groups to another exhibit (which, apart from the different medium, had some similarity of content and treatment) a collection of seven prints was displayed at the same school. Since the display took place six months after the ceramic exhibit, it was assumed that some of the former similarities or dissimilarities among the groups would be more distinct, because of the intervening six month period of teaching in Elective Art and in the Creative Arts course.

a. Comparison of effect of this collection with effect of ceramic exhibit. (See Table I). The difference of reactions between the Elective Art group and both the Creative Arts group and the English group is much more distinct. While 100% of the Elective Art group interpret qualities of a print as representing aesthetic-technical achievements, an adequate subject and emotions, and while 39% of this group accentuate especially the aesthetic qualities in their main comment, only 30% of the two other groups make any general comments in this direction and only 3% have a main interest in the aesthetic achievement. Parallel to these percentages there are 50% more comments on aesthetic qualities on the part of the Elective Art group than before (ceramics), though less comments which are of main importance, while the comments on aesthetic qualities of the Creative Arts group show a 30% increase in general comments on aesthetic qualities and the English group a slight decrease. On the other hand, the interpretation of the prints in terms of emotional associations has decreased (both in the total of comments and in main comments) on the part of the Elective Art group and substantially increased on the part of the two other groups (Main comments: Creative Arts group—92%, English group—83%).

Indications of preferences also show a clear and clean-cut difference in that one-half of the preferences of the English and the Creative Arts groups center on the same print (No. 4), while the Elective group prefers the print which comes next in preference of the other two groups (No. 2). The Elective Art group scatters two-thirds of its preferences evenly among five other prints (Print No. 3 is little liked by any group) while the other two groups pay scant attention to the other five prints, since their two preferences average 81%).

b. Interpretations and conclusions regarding (2) and (3). Accordingly we are justified in saying that a comparison of increase and decrease in types of comments and preferences indicates distinctly a development of appreciation of visual art qualities on the part of the Elective Art group, and centering of interests on aesthetic-technical and art object qualities; a slight increase in the appreciation of aesthetic-technical qualities on the part of the Creative Arts group, and no difference at all on the part of the English group. The similarity of interests between Creative Arts and English groups is as great as six months before, while the dissimilarity between these two groups and the Elective Arts group has increased.

In terms of gains through learning or success in teaching we can say that the Elective Art group has obviously gained in observation and interpretation of art objects through instruction. Since this group works productively, the gains must be obtained by indirect instruction, because they show in its *art*

appreciation, whereas the instruction is given in *creative art activities*. In other words, teaching art through productive activities seems more successful regarding appreciation of the visual arts than teaching through integration of all the arts.

4. *Drawing Activity for Purposes of Appreciation*

The experimental class mentioned before (see Section II C) pursued as its primary objective appreciation of art objects by means of an art activity. Appreciation was not to be incidental, a by-product of art activity. It was to be the main and direct goal of all instruction as well as of the evaluation of children's achievement.

All lessons were chosen with this purpose in mind. The material was so selected that the attention of the students could be directed to certain characteristics and their own productive work based on them.

The use of an exhibit of Expressionists may serve as an example of the procedure of guidance. From our Art Appreciation Studies it is evident that children like realism in a picture, or "trueness to nature". None of this is to be found in an exhibit of expressionistic painting. Therefore, exposure of the children to it without comments would be of little advantage. The teacher[6] discussed " the reasons which could possibly induce artists to paint such pictures and . . . to decide how color contributed to the desired effect." In their subsequent drawings, children studied the color effects on the mood of the pictures by changing the colors in drawings of their own which had the same subjects as the paintings on exhibit. In a second lesson they made "pictures whose end was the expression of an emotion". Similarly, various techniques such as prints, as well as styles in art and characteristics of periods in art, were studied by making drawings and paintings closely connected with training in perception and interpretation of art qualities.

Whether or not a child was able to show his understanding through the medium of drawing, at least he gained more in the appreciation of art through studying it along with his productive activity, than he would have gained through mere passive listening to talks on art.

[6] Mrs. Esther M. Sills conducted this class. The above quotation is taken from her report on the activities and results of this class.

APPENDIX I

LIST OF CHARACTERISTICS OBSERVED IN CHILDREN'S DRAWINGS

Note: In the *Graphic Work-Sample Diagnosis* (Sections II and III of *Manual*, p. 23f, 33f) each of these characteristics is defined and illustrated. Each drawing was checked in the 'Analysis' for presence or absence of these characteristics and for a considerable number of others such as representational and thematic unity, not used in the Diagnosis.

Part I. Representation

1. *Representative Level.*
   Scribble. Primitive Schema. Schema. Mixed Schema.
   True to Appearance.
2. *Representation of Space.*
   A. Linear perspective.
   B. Types of perspective.
      a. No perspective attempted: one-dimensional representation; figures only; plan or map; elevation. Two-dimensional representation; confusion of viewpoints; mixture of top view and side view; turned-down objects; multiple elevations and mixtures.
      b. Perspective applied in part: incorrectly—in a few objects; in walls; in combination of walls and objects.
      c. Perspective applied throughout: incorrectly.
      d. Perspective applied throughout: correctly.
   C. Clear arrangement.
   D. Planar arrangement: one plane; many planes; planes showing distance.
   E. Modelling.
3. *Size relationships:* correct; markedly incorrect.
4. *Representation of figure.*
   A. Operation of figure correct.
   B. Position of figure: standing; sitting; sitting successfully suggested.
   C. Aspect of figure and face: front; back; aspect of face (mixed profile; profile; three-quarters view).
   D. Figure flexibility: school room (rigid or almost rigid; teacher flexible; figures flexible).
5. *Representation of details and surroundings.*
   A. Many details.
   B. Development of details in landscape: very few; many. Figure details (schematics).
   C. Head details.
   D. Clothing details: clothing richly developed.
   E. Development of surroundings: no surroundings; surroundings suggested; surroundings richly developed.
6. *Representation of motion.*
   Motion attempted at all; motion attempted successfully; motion considerable; motion considerable and successful; movement of inanimate objects.
7. *Representative color usage.*
   Local colors true; light and shade; distance; variation from local color.

PART II. AESTHETIC MEANS AND TECHNIQUES

1. *Line characteristics.*
Hesitating line; decisive line; bold line; subtle or delicate line; decorative use of line.

2. *Area characteristics.*
Ragged or smudgy areas; smooth areas; graded areas; blended areas; bold areas; texture areas; light and dark contrast; area against area; line and area.

3. *Outstanding color usage.*
Contrasting; non-contrasting; organizational.

4. *Use of medium.*
Inconsistent use of medium; consistent and moderately effective use of medium; consistent and unusually effective use of medium.

5. *Clarity of outline.*
Clear outlines against white or color; intentionally indefinite shapes.

6. *Organization.*
A. Centering: drawing not centered.
B. Use of balance: unbalanced arrangement; symmetry or near-symmetry; intentional asymmetry.
C. Grouping; unusual; unorganized.
D. Decorative arrangement.

7. *Tendency toward style.*
Expressionism; impressionism.
Decorative or ornamental effect.

PART III. SUBJECT MATTER

1. *Subject matter:* figures; heads; animals; transportation; still life and other inanimate objects; landscape; figures in landscape; figures in interior; transportation in landscape; animals in landscape or interior; map or plan; design or pattern.

2. *Type of figure.*
Individualized; comic or caricature; portrait; cartoon; cliché.

APPENDIX II

ART PROJECT ANALYSIS RECORD SHEET: STUDENT'S RECORD

I have been given this sheet with the understanding that I will try to fill it out as best I can, but that I will not write in it anything which I do not want to write or which seems doubtful to me. There are several statements to which the question "why" or a similar one is added. If I do not know "why", for instance, in III, 4, "I made changes in my plans as my work went on", I am not expected to answer this question.

I. Planning the art project.
1. General statements.
a. My project is .....
b. My teacher made some suggestions which are .....
c. I have done something of this kind before .....
d. The idea for this project came to me .....
e. It was my own idea to use this technique .....
this medium .....
and other such things as .....
f. I am doing this simply because I think I will enjoy it
Other reasons why I am starting on it are .....
g. This project has to do with another school project, namely .....
This project has to do with something I am doing outside school .....
h. I just like to experiment with this project

2. Something more about this project.
a. I am going to make a painting
I am going to make a model
I am going to make something in the way of crafts; it will be a .....
I am going to make .....
b. I will use the medium .....
The reason for using just this medium is .....
c. I am going to make it large ....., medium sized ....., small .....
d. When my project is finished:
it will be imaginative
it will look very real
it will illustrate a story I read
it will be .....
e. I expect that this project will take as long as .....
f. I want my finished work to fit certain surroundings.
It will be placed
in my home
in the school
other place .....
The place I want it for is
modern looking
old-fashioned
It has a color scheme such as .....
It has particularly strong lines, such as .....
There is something else about this place; namely .....
g. I am going to use reference material
It will be
books
magazines
some notes of my own
pictures
some modeled objects
some craft products
or .....

II. Working out the project.
1. General statements.
a. I am doing this project entirely by myself .....
b. My teacher is helping me
a little bit
quite a bit
very much

2. Something more about the execution of the project.
a. I find this project easy, because .....
I find this project difficult, because .....

b. I am especially interested in
making my work look round
giving it body
showing depth
giving it a flat effect

III. Judgment of finished work.
1. I have done what I really set out to do ....
.....
2. The part I did best is
the composition
the color scheme
that I made it look real
and that I .....
3. I feel satisfied with what I have accomplished
.....
4. I made changes in my plans as my work went on .....
The reason why I made them .....
5. I have learned while working on this project
.....
Particularly I have gained .....

APPENDIX III

ART PROJECT ANALYSIS RECORD SHEET: TEACHER'S RECORD

This record sheet follows in its arrangement the teaching procedure of the Shaker Schools and has been devised by the Research Staff of The Cleveland Museum of Art, Department of Education, with the assistance of Miss Ely and Miss Corser of Shaker High Schools.

Teachers using these records are requested to answer all items on this record sheet to the best of their ability and as accurately as contact with the students will allow them to do. However, it is clear that the answers to items such as III, 11—"Irrelevant success" or III, 8—"What reason did the student offer for the changes which he made" do not depend on the teacher's observation alone, but are a matter of observation by non-art teachers or articulateness on the part of the student.

I. Planning the art project.
1. General statements.
a. Statement of project .....
b. Complementary suggestions of teacher to student's plan .....
c. Statement of student's past experience relating to this project .....
d. Student's idea of the project originated
from his reading
because of influence of another student
after seeing exhibits
other sources .....
e. Which part of the student's project is his own
ideological content
technique of execution
medium to be used
others .....
f. Are the student's objectives
of an immediate nature
of the far future
part of a general objective
is there no objective, only enjoyment of the activity connected with the art project
other comments .....
g. Is this project related
to other school projects
to extra-curricular activities
h. Student uses project mainly for purpose of experimentation .....
2. Details concerning the intended project.
a. The project is to be executed in
painting
modeling
craftwork ....., which .....
other .....
b. Medium to be used .....
Reasons for choice of medium, given by student .....
explanation of teacher .....
c. Size .....; reasons for choice of size .....
d. Finished project is supposed to express
something imaginative
something real
illustration of a story
an abstract idea
a mood
a detailed statement
other .....
e. How much time will the project take?
f. Does the finished work have to fit certain surroundings:
functions of surroundings
modern in style
old-fashioned in style
color scheme
linear arrangement
other .....
g. Will reference material be used? .....
If so, will it be
magazine articles
books
student's own notes
pictures
modeled objects
craft products
other .....

II. Execution of project.
1. General statements
a. Is the student working on his own, independently?
In which direction is his independence especially noticeable?
b. Amount of help required from the teacher
very little
a moderate amount
very much
c. Kind of help required
ideas
matters of arrangement and design
details
technique
matters of skill and craftsmanship
use of reference material
other .....

2. Detailed statements of needs peculiar to project in question
   a. Estimate of difficulties
      subject choice
      medium in which it is carried out
      concerning design
         line
         color
         shape
         other
      others .....
   b. Has student difficulties in visualizing the two-dimensional aspect peculiar to his problem?
      Has student difficulties in visualizing the three-dimensional aspect peculiar to his problem?
      Is he trying to emphasize the three-dimensional appearance with a two-dimensional medium for the sake of achieving "reality"?
      Is student inclined to model in a "flat" way?
      Has he difficulties in visualizing the all-round aspects of a piece of modeling?
   c. Does student work in his own manner?
      If so, does he modify it to suit the project at hand?

III. Evaluation of finished product.

1. Have the objectives, specified under "Planning the art project", on the whole been attained?
   Check the following items as far as they compare with actual achievements
      statement of project
      medium to be used
      the project is represented in painting, etc.
      size
      finished project is supposed to express
      how much time will the project take
      has the finished work to fit certain surroundings
      reference material used
2. Growth of student as evidenced by actual achievement, state which parts .....
3. Does the student appear to be satisfied with the results of his work .....
4. Is the student aware of the difference between his plans and his final product?
   Does he feel satisfied with the changes he made in the course of his work?
5. Growth of student regarding the different aspects of his work
      ideological
      technical
      in critical attitude
      along aesthetic lines
         arrangement
         color scheme
         lines
         contrasts
         other
      other .....
6. The kind of result admired by the student in this kind of project is being done by .....
7. State the reasons for changes as you have observed them
      new ideas while working
      unable to foresee all steps
      original plan too vague
      difficulty with medium
      reference material offered different suggestions
      other .....
8. What reasons did the student offer for the changes which he made?
9. State kind of self-criticism exercised by the student
10. Teacher's criticism is received by student
      reluctantly
      attentively
      followed up by intelligent questions
11. Indirect success; gains in matters not concerning the project in hand
      technical
      conceptual
      describe more fully

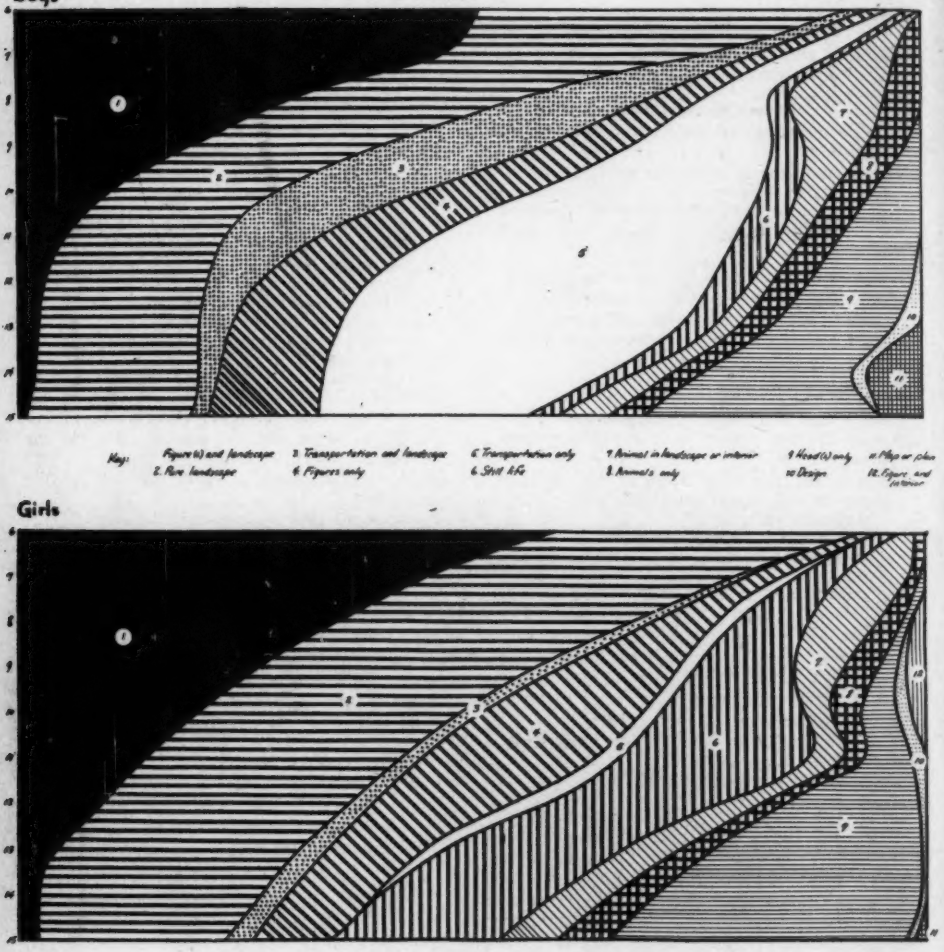
IV. Estimate of Progress.	slight	moderate	high	extraordinary
1. Conceptual (formulation of idea underlying project)	.....	.....	.....	.....
2. In independence of execution	.....	.....	.....	.....
3. In technique	.....	.....	.....	.....
4. In skill	.....	.....	.....	.....
5. In aesthetic (design) qualities, general	.....	.....	.....	.....
in particular: color	.....	.....	.....	.....
in particular: line	.....	.....	.....	.....
in particular: areal arrangement	.....	.....	.....	.....
in particular: contrast	.....	.....	.....	.....
in particular: massing	.....	.....	.....	.....
in particular: subtlety	.....	.....	.....	.....
6. In mastering the two-or three-dimensional (as indicated by student's own efforts to master this particular phase of his problem) ..	.....	.....	.....	.....
7. In assimilating suggestions and influences	.....	.....	.....	.....
8. In using reference material	.....	.....	.....	.....
9. In persistence to reach his goal	.....	.....	.....	.....
10. In application of experiences gained through previous projects	.....	.....	.....	.....

Graph I

Choice of Subject

Drawing I

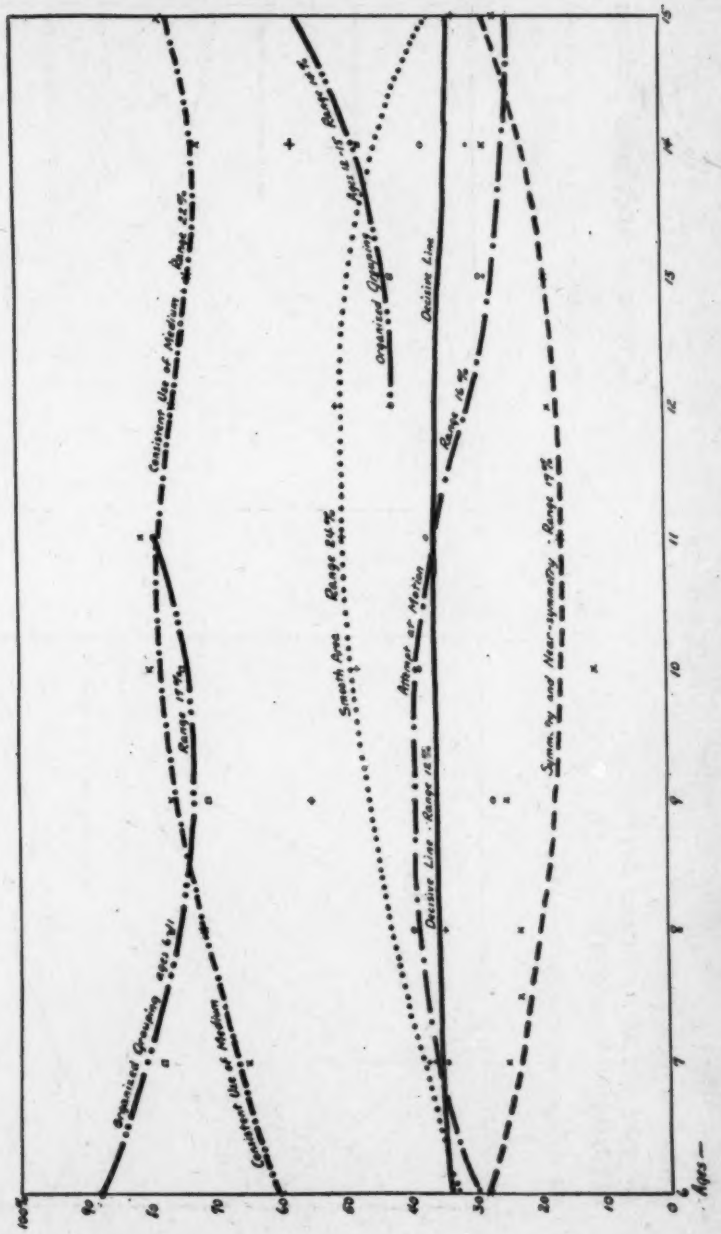
(From Table, p. 42 Graphic Work-Sample Diagnosis)



Graph II

Graph IX

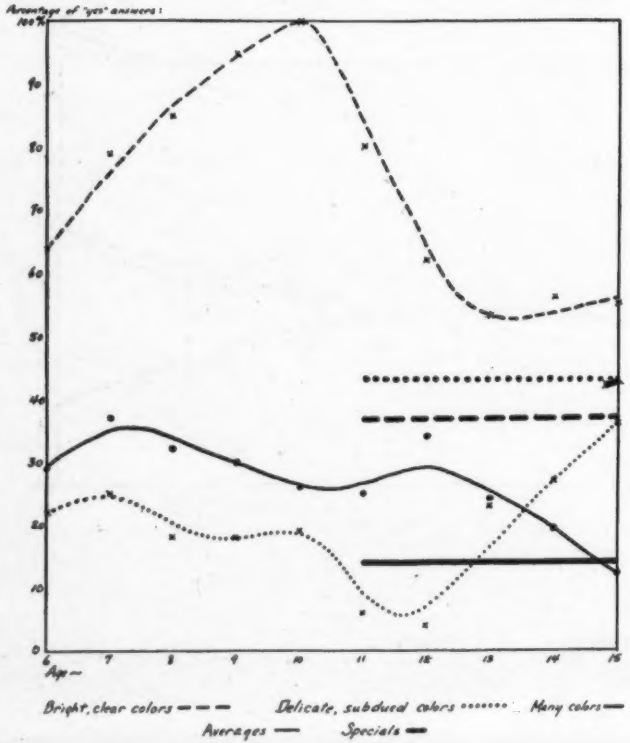
Constant Characteristics (Averaged 6-th)



Graph VI

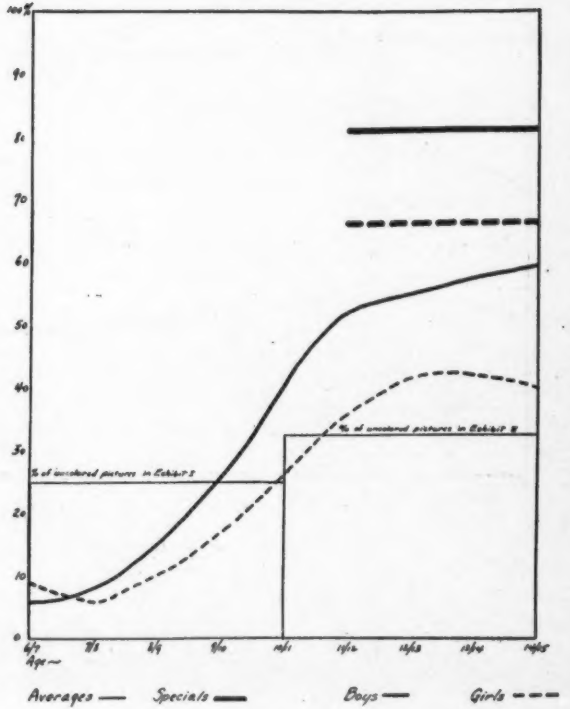
Answers to the question:
"Do you like this pattern best because of its colors?"

From Art Appreciation Study III - Textile Pattern Preference

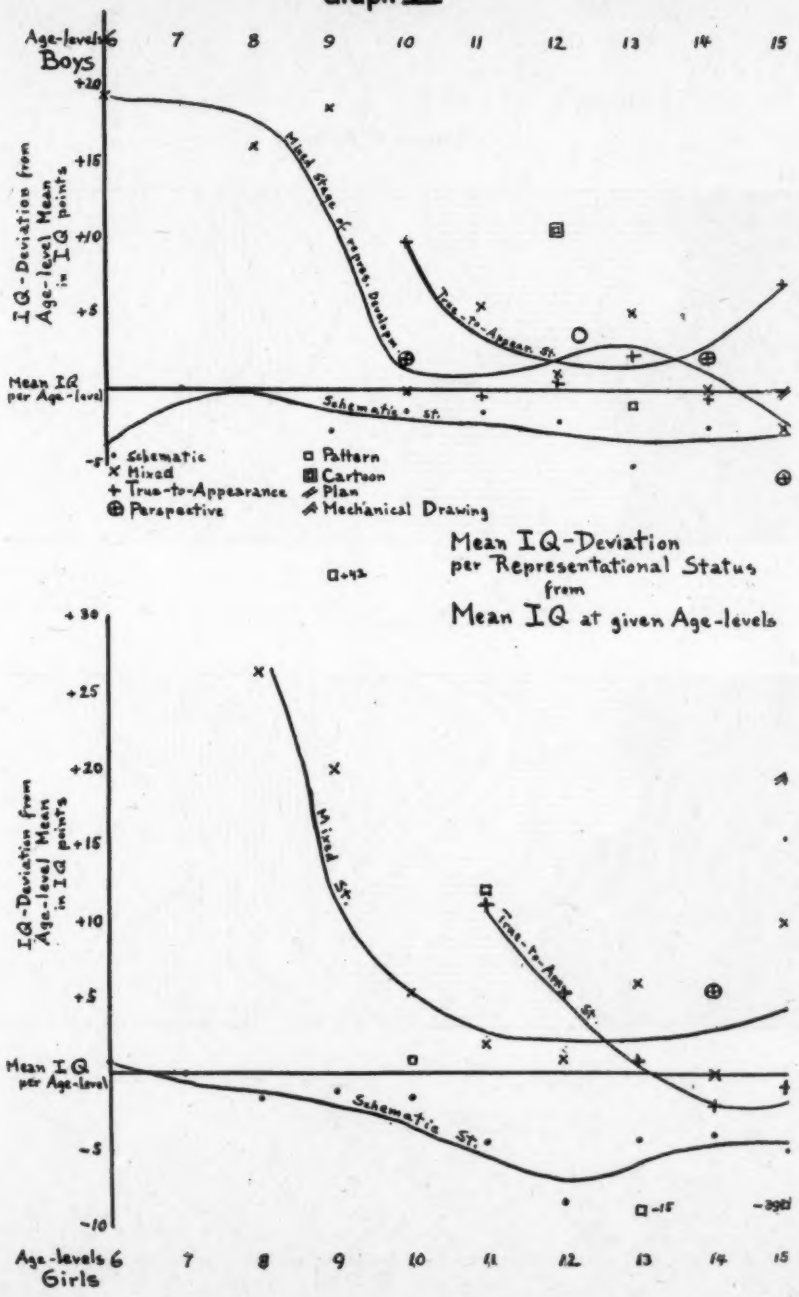


Choice of uncolored pictures

From Art Appreciation Study II - Picture Preference



Graph VII

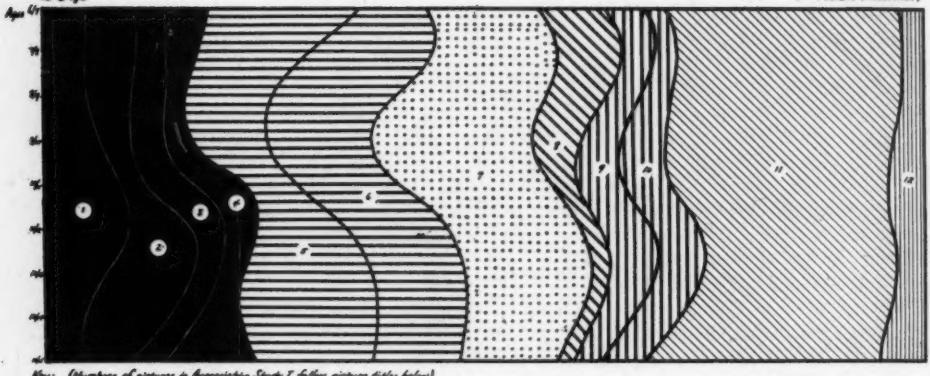

Age-levels 6 7 8 9 10 11 12 13 14 15
Boys
+20
+15
+10
+5
Mean IQ per Age-level
-5
IQ-Deviation from Age-level Mean in IQ points
Mixed Stage of repres. Develop.
True-to-Appearance St.
Schematic St.
Schematic
Mixed
True-to-Appearance
Parapective
Pattern
Cartoon
Plan
Mechanical Drawing
Mean IQ-Deviation per Representational Status from Mean IQ at given Age-levels
+30
+25
+20
+15
+10
+5
-5
-10
Mixed St.
True-to-Appear. St.
Schematic St.
Age-levels 6 7 8 9 10 11 12 13 14 15
Girls

Graph VIII

Choice of Subject

(From Appreciation Study I: Picture Preference)

Boys



Key: (Numbers of pictures in Appreciation Study I follow picture titles below)

Figure(s) and Landscape
1. Henri Thomas: Dancing in a Ring (3)
2. Bastien-Lepage: Joan of Arc (7)
3. Bouguereau: The Bathers (4)
4. Fantin-Latour: Tannhauser (2)

Pure Landscape
5. Carl Huber: Marsous (8)
6. Corot: Evening (6)

Transportation and Landscape
7. Wyeth: Coast on Sea (from "Black Arrow") (11)

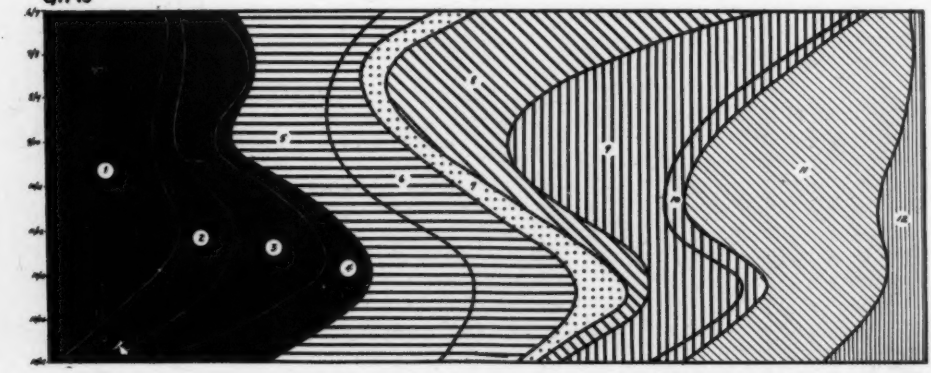
Figure only:
8. Bitchenny: Portrait in Pink (1)

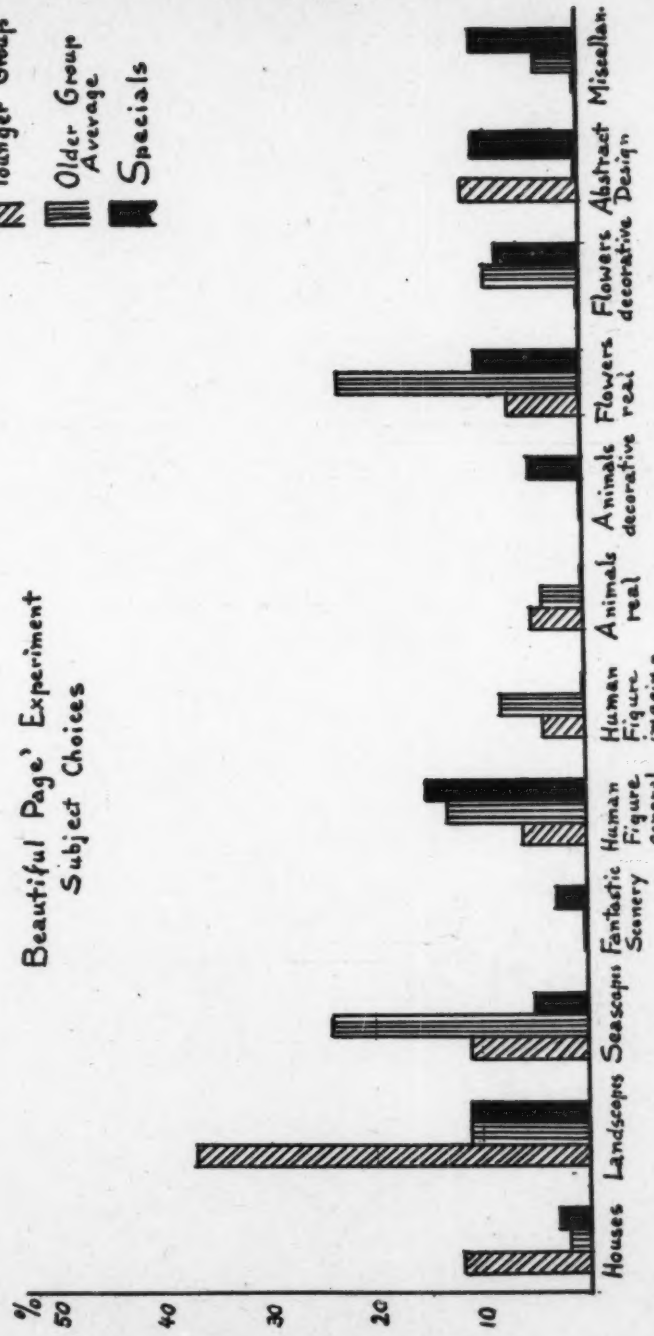
Still Life
9. Renoir: Flowers (10)
10. Courbet: Apples (9)

Animals in Landscape or Interior
11. Lifafer: Swans

Figure and Interior
12. Le Sidaner: The Dessert

Girls



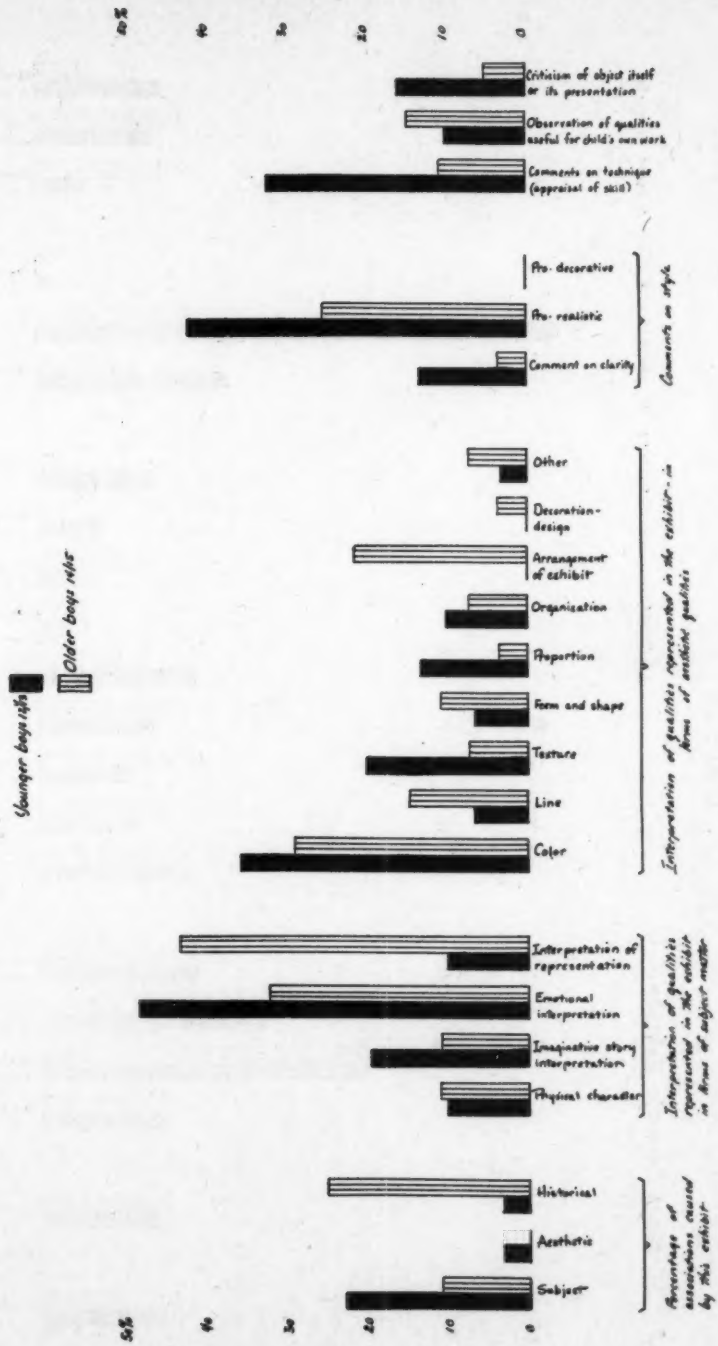

Graph IX
Beautiful Page' Experiment
Subject Choices
Younger Group
Older Group Average
Specials
%
50
40
30
20
10
Houses
Landscapes
Seascapes
Fantastic Scenery
Human Figure general
Human Figure imagin.-unusual
Animals real
Animals decorative
Flowers real
Flowers decorative
Abstract Design
Miscellan.

Graph X
Beautiful Page' Experiment
Comparison of Quality Norms (Analysis) with
percentual occurrence of Qualities in this Experiment.
--- Norms
—— Beautiful Page
%
100
90
80
70
60
50
40
30
20
10
0
Ragged
Subtle
Bold
Line.
Ragged
Smooth
Blended
Graded
Bold
Area
Inconsist.
Moderat. effective
Unusual effective
Use of Medium
Clarity of
Intuitive Indefinite
Precar. Arrangem.
Symm. & Near-Symm.
Intuitive. Asymm.
Thematic Developm.
Outline

Graph XI

Museum Ceramic Exhibit

Comparison of comments of younger and older groups of boys



Graph XII

Museum Ceramic Exhibit

Comparison of comments of younger and older groups of girls

TABLE I

TABLE I

COMPARISON OF CERAMIC AND PRINT EXHIBITS (HIGH SCHOOL)

Change of attitude and interest (and perceptual gains) during six months

(Comparison of reactions between three student groups (1st: exhibit of ceram. obj., 2nd: exhibit prints)

Numbers denote percentages		Descript. of certain qualities as essential			Interpr. of qualities of object as represent adequately			Interpret. of cer. obj. or print in terms of Emotion. Assoc. caused by objects				Interest shown in																						Form of Comment							
												Represent. of			Style			Aesthetic Qualities referring to:																							
Exhibit of ceramic obj.	No. of students	Represent.	Subject Matter	Technical	Aesth.—technic. achievm't	Subject	Emotion	Representat. Qualities	Subject	Aesth. Qualit.	Total of Assoc.	Realism	Expression	Motion—Action	Realistic	Imagin.—Fantast.	Decorative	Solid Quality	Hard Lines	Motion (line)	Roundness	Form—Composition	Simplicity	Outline	Group—Arrang.	Design—Decor.	Proportion—Balance	Color—brightness	Detail	Texture	Daintiness	Technique	Position	Letter	Poetic Prose	Critique	Advertisement	Poem	Prose	Short Story	Direct Expression of Dislike
Elective Art Stud.—Total Comm.		7	27	7	13	10	10	33	30	17	80	37	10	33	10	10	3	17	3	7		23	7	3		7		37	3	30		53	17	17	3	73	3	3			10
Main Interest	30	3	10		3	3	3	10	10	3	23	10	1			3		3					3								27								
Creative Art Stud.—Total Comm.	23	4	13	4	8	8	8	4	82		86	17	12	26				8	4	22		4	4				12		12	4	17	8		4	30		39	17		4
Main Interest			4		4	8	4		65		65	4	4							4											4								
English Stud.—Total Comm.	30	13	10	13	3	3	3	30	67	3	100	47	17	in general		7		3		10	3	7			13		3	27	3	3		13	3			93				7	43
Main Inter.		3	3		3	3		7	43	3	53	17													3				3										

Exhibit of Prints																																								
																		Light-Dark Constr.	Motion; bold line	Shading						Medium of Drawing													
Elective Art Stud.—Total Comm.	23		4		39	39	22	17	30	8	55	26	35	30				35	43	35	17	26	5	4			26	13	4	13		74	4		4	92			4		
Main Interest					39	8			17		17	4																			13									
Creative Art Stud.—Total Comm.	23		4		8	13	13	13	96		109	17	8					17	13	8	8	13	8	8	8		4	4	8			30	4			48		22	26		
Main Interest					4				92		92																				4								
English Stud.—Total Comm.	29				10	17		21	86		107	17	17						10	3	3	7	10	7		3				3		34	3			45		3	45	3	
Main Interest				3	3			7	76		83		3																		7								

The percentages of "Total Comments" do not add up to 100, since a number of comments permit more than one interpretation. Percentages of "main Interest" add up to 100.

DEVELOPMENTAL STAGES IN COMPOSITIONAL CONSTRUCTION IN CHILDREN'S DRAWINGS

EDWARD N. BARNHART

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INTRODUCTION

The field of children's art has been intensively studied in the past half-century from many standpoints. The interest of psychologists has chiefly centered around the developmental stages evident in the child's drawings of objects and scenes as he progresses from the scribble to the relatively true-to-life representation, from schematic symbolism to visual realism. Of late, there has been considerable interest on the part of psychologists in the artistic creations of children as expressions indicative of underlying personality traits and emotional attitudes. Drawings have been studied in the light of their value as indicators of emotional stresses and personality trends and drawing itself as a possible therapeutic agent.

We are not so much concerned in this study with the nature of the child's creation or his development, as in a study of the *process* whereby he constructs a drawing. How does a child actually go about drawing a picture? How does he build up a picture, a landscape, say, with figures in it? Does he start with one object and finish it completely before going on to others? Or does he sketch out the whole plan and build up all the parts gradually and together? In short, what is his procedure in constructing a drawing?

We are further interested in any light such a study may be able to throw on the interests guiding the child as he works and thus

on his creative processes. What can we gather from his procedure of the considerations which are directing him? What is his response to the subject of the drawing given to him, and how does his conception appear to develop?

This aspect of the child's creative activity appears to have been studied only incidentally. Ayer, in "The Psychology of Drawing"[1] analyzed different types of drawings and described the psychological factors responsible for success in each type, but was not concerned with the process of making drawings or the ways in which individuals proceeded.

Recording Device

In order to study the actual drawing process, a device, called a recorder, was constructed which enables the experimenter to secure a record of the successive stages in the development of a drawing without disturbing the child at his work. Such a record enables us to go over the actual steps in the drawing again and again, studying their relation to the finished work, and to determine the order of procedure, almost line by line, from the first to the last stroke.

The recorder is illustrated by a sketch in Figure 1. It consists of a flat wood frame, 2 feet 2 inches wide and 1 foot 8 inches deep, with a vertical height of 3 inches at the front and 6 inches at the rear. The top is covered with a board which slopes up gently from the front and is the surface which supports the drawing. At the front of this top-piece a slit *A*, was cut, one foot long, about one-quarter of an inch wide, and 3 inches from the front. Inside the frame at the rear a loosely-moving length of pipe was hung on brackets. A large piece of heavy cardboard, *B*, with an opening slightly less than 11 by 14 inches centered and toward the front, was made to be thumb-tacked to the top surface, covering it entirely and flush with the edges of the supporting frame.

The recorder was set up for operation as follows. A one-hundred-foot roll of white shelf-paper, 14 inches wide, was hung, *C*, on the pipe underneath and an end put through the slot and carried over the top surface. On top of this, long edge parallel to the front of the recorder, and one-quarter inch from the slot, was laid a piece of white paper, 11 by 18 inches in size, *D*, which was fastened to the top surface at the sides only by Scotch tape, leaving the roll paper free to move beneath it. This paper is called "white back book carbon" and has a carbon surface on its reverse side. Then the large piece of cardboard, *B*, was laid down over all and fastened in place.

When this had been done, a drawing surface approximately 11 by 14 inches in size of white paper was visible. This was the paper on which the subject drew, *D*. Its carbon backing left a record on the roll paper, *C*, below it. (It is possible to use

[1] Baltimore, 1916, 186 pp.

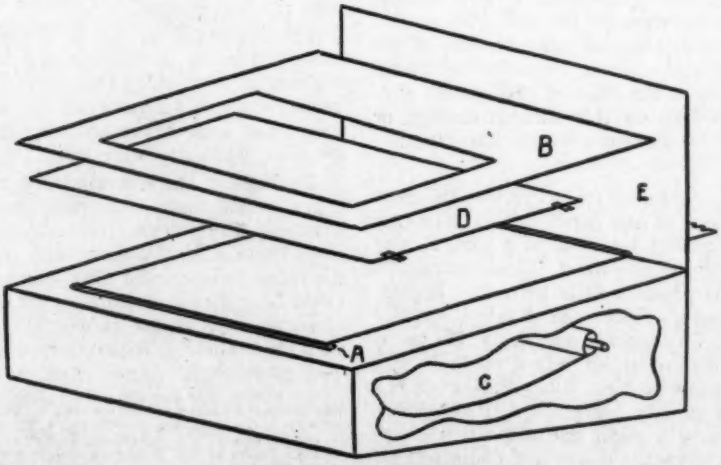

Fig. 1.—The Recording Device

separate sheets of drawing paper and carbon, but in addition to the difficulty of securing neatly, it does not give as nearly a clear and distinct impression as one sheet does.) Below this sheet the roll paper moved freely at the control of the Experimenter, who sat facing the Subject over the whole device. (It was found convenient but not necessary to build a small screen, *E*, which rose vertically about eight inches at the rear of the recorder with a slit in it for the roll paper. This kept the child from being too much interested in the record of what he had done.)

The experimental procedure was as follows. The child sat before the recorder, which was on a low table. When the instructions had been given, he drew with pencil or crayon on the white paper surface, *D*. At regular intervals, the Experimenter, after a cautioning word, drew out a length of the record paper, *C*, and the child continued work. The length drawn out was just the height of the paper on which the child was drawing. This gave a series of records of the drawing procedure from the first to the last stroke. As the experiment proceeded and more paper passed through the recorder, it was allowed to pile up on the floor and only rolled up when the period is over to avoid confusion during the experiment.

The purpose of the over-lying cardboard, *B*, was to give a neat appearance, prevent the white record paper from being noted when it was moved, and to prevent it from binding when moving through the slit. No trouble was experienced at all with binding. Since the top of the recorder extended six inches on each side of the drawing surface, the children could lean on this without damage or restricting the movement of the paper underneath.

With the device set up in this way the child was not aware of any paper moving, although the Experimenter told him in a general way what the device performed. He was requested to raise his pencil a little when the Experimenter spoke, which the Subject rapidly came to do very quickly and easily. He heard a slight rasp of paper when the roll was pulled, but saw nothing. Every Subject in the experiment quickly learned to return to drawing after only a slight pause for this interruption. Apparently it did not disturb them at all after the first few times.

Experimental Procedure and Subjects

Children ranging in age from five to sixteen years were used as subjects, with both sexes equally represented. A total of fifty-two children were used, with approximately five at each age-level. In selecting these, no attempt was made to pick out the best or poorest. They were taken by chance from Saturday-morning open classes at the Cleveland Museum of Art over a period of four months.

The experiments were held in a room apart from the galleries. The Subject was taken in, shown the apparatus and told briefly what it would do, and seated before it with pencil or crayons and told that in a few minutes he would be asked to draw a picture. Some personal data was secured, consisting of age, school grade, school, and handedness. Then the experimenter explained the purpose of the device and instructed the subject how to cooperate with him in handling the paper. Following this the drawing instructions were given.

The instructions were in the form of a request to draw a picture. The subject was asked to "Make a picture of children playing out of doors in the snow in the winter-time in a park." Since the age-range was considerable, the form of instructions was varied to suit the age of each child. With the younger, some preliminary conversation was undertaken to make them feel at ease, often turning on their favorite sports in the winter. With the older ones this was omitted.

The Experimenter sat at the side of the table and facing the Subject and in a position convenient to grasping and pulling evenly the record paper. He kept a pad of paper on his knees and kept a protocol of the Subject's remarks, when any were made.

Throughout this experiment a record was taken at one-minute intervals. Most children draw so slowly that this interval of time gives quite a few lines on each frame. With the older children who draw more quickly, it could be cut to half-minute intervals or perhaps smaller, if an automatic cooperation with the Subject in regard to raising the hand were established.[1] As we noted, every Subject

[1] The progress of constructing a single object can, of course, only be seen if enough records are taken to ensure that only parts, or a few lines, are in each frame. To study sequence of objects drawn in compositions it is necessary to take sufficient frames so that 2 or more complete objects are not on one frame; in such a case, the order of their construction is not determinable.

appeared to be interested in drawing, and the regular interruption of stopping drawing and raising the hand for a few seconds became habitual and non-distracting.

The time consumed in saying "Stop," or uttering merely a meaningless monosyllabic "grunt," waiting for the Subject to stop drawing, and in pulling the paper, consumed usually about 6 seconds after the Subject was used to it. Some Subjects took between 4 and 5 seconds, while others were longer. If the interval for each frame were only 15 seconds (one-fourth the interval of our records), this might prove very distracting.

Schematic Level of Representation

Methods of Drawing the Figure. In analyzing the results of this experiment, we follow a genetic order. We begin with those drawings in which the nature of the figure is characteristic of the earliest level of representation, the schematic, and work up to those of the representative forms of the older children wherein an approach is made to a visually realistic representation, the true-to-appearance level.

This factor, the representative form of the figures, is chosen for convenience and not because it is the most essential characteristic, or determines the nature of other characteristics of the drawings. As we shall see, drawings with figures of the same crudely representational type differ in many other important qualities.

As mentioned above, fifty-one children between the ages of five and sixteen were selected by chance from the Museum's Saturday morning classes. In Table I we show the frequency of occurrence of drawings of these three representative levels throughout the range of ages.

Since the stages of representative development have been so thoroughly studied by others, we will merely outline briefly their major qualities.[2] It will, however, be necessary to describe various characteristics of the drawings, such as style, spatial representation, and form of organization, since an analysis of a process of production is hardly complete without a description of the final product.

In the schematic stage, objects are represented by means of simplified "diagrams" or schemas. These are not visually realistic at all and bear but a slight resemblance to the object for which they stand. They are flat forms, with no depth or foreshortening and with no indication of conditions of light or of time. They are much closer to an "intellectual" than to a visual realism and represent more a statement of what the child knows about the major features of the object than an attempt on his part to present a visual record or account.

[2] A convenient summary and bibliography is given by Goodenough in the article "Children's Drawings" in the *Handbook of Child Psychology*, Worcester, Mass.: Clark Univ. Press, 1st ed., 1931, pages 480–514.

Table I

Representative Level of Subject According to Age

Age	Level of Figure		
	Representative Schematic	Mixed Schematic	True-to-Appearance
5	1		
6	4		
7	5		
8	3	2	1
9	4	1	
10		1	4
11	2		3
12	1		5
13		2	2
14			6
15			3
16			2
	20	6	26

As the child grows older, his drawings tend more to the visually realistic type. He draws "scenes" in perspective and with objects in foreshortening and introduces aerial perspective effects. There is a general tendency among all children to approach toward a naturalistic rendering of figures and scenes with increasing age.

In most of the schematic-level compositions drawn in this experiment, the setting or surrounding was very slightly indicated. In many of them only a line indicated the position of the ground, and a stretch of blue, the sky. Trees and sleds were fairly frequent. The typical drawing contained a number of figures standing or sledding, some indication of ground and sky, and a tree or two or a snowman.

Inspection of the typical schematic figure reveals that it consists of an outline filled in uniformly and flatly with colored crayon or pencil broadly applied. In this experiment, in every case where the inner areas were colored, the schemas were drawn by outlining the entire body and then filling the areas in with

color or pencil. Seventeen Subjects followed this procedure, and three left the interior spaces empty. The usual practice was to draw the outlines in pencil and to use crayons for the areal filling-in. Often the outlines would be drawn in crayon over the pencil.

In drawing the figure, the head outline was given first, in most cases, followed by the body and then the legs and arms. Then a return was made to put in the details of the face and head: eyes, mouth, ears, and sometimes hair. Then other bodily details were put on last, if indeed they were present at all. When all the details had been added and the outlines finished, the inner surfaces were colored over in flat uniform color.

Individual differences were observed in this progression, but the first consideration appeared to be the statement of the head outline, hat, or covering. Details of the face were usually left to the last, just before adding the coloring.

There were no evidences of the use of construction lines. The outlines were put down directly and with hardly ever a retracing or re-forming.

In the cases where the figures were shown on sleds, the drawing order was reversed. If the sled was drawn first, the body would come next, followed by the head last. In the twenty schematic drawings, five showed figures on sleds, and this was the practice in all of them.

In the drawings in which a number of figures were shown, we find differences between individuals *in the order in which they drew the figure's outlines and filled them in with color.*

Some subjects drew each figure or object *and colored it completely before proceeding with the next one.* Each unit was started and then finished. When it was completely colored, the child moved on to the next one, drew its outline in pencil, and colored it in crayon. Of the seventeen schematic drawings in which figures were colored, eight showed this type of coloring procedure.

The other nine children drew *all* the outlines in the whole picture first in pencil and *then took up crayons and colored them.* Here the outlines of all objects were put down before any one of them was finished or touched with color.

Several different ways of going about the application of colors were evident in this group which colored objects at the last after drawing *all* the outlines. Some subjects completely colored a figure in all its colors before passing on to another. This procedure was followed consistently by *Kl* (11:9),[3] *Mc* (9:9) and *Wa* (7:11).

Two subjects adhered closely to this procedure but with some variations. *Nu* (5:12), who drew four figures and a house, began his coloring by applying crayon to all the faces of his four figures with orange, but then went back to color the figures individually with all their colors and to complete each before touching the next. *Gs* (8:0) drew two figures and six trees. He colored the scarf on one figure, then turned to the second to color it completely with four different colors, and then returned to the first and finished it with three.

The consistent use of one color throughout in all of its locations was found in the drawing procedure of only one child, *Th* (9:3). He drew ten objects—airplanes and airdromes—which he colored with five colors. Most of the objects colored had two colors. Each color was used throughout the drawing at each place where it occurred and then not touched again. The only exception to this was in the case of the sky, which was colored blue last of all after using blue in several places in the mid-period of the coloring.

In this procedure the child jumped from unit to unit with whatever color was called for. When that color had been used in all the places where it was wanted, a second color was chosen. According to this way of proceeding, it was not until the last color was used that the drawing was entirely finished.

One subject adhered fairly closely to this procedure. *Kn* (7:5) used red throughout, then yellow, blue, green, and brown, in that order. She then used red a second time in one spot in adding windows to a house, and followed with some brown lines on it. Then orange and green were used in several places.

Two subjects, *Wo* (6:8) and *Gl* (7:6) (see Figure 2), applied colors and in an order that followed the unit-completion procedure for a time and then turned to the use of one color throughout for a short time and then reverted to completing units. The two tendencies competed, apparently, and neither held dominance for very long. This is shown

[3] Figures in parentheses represent age in years and months.

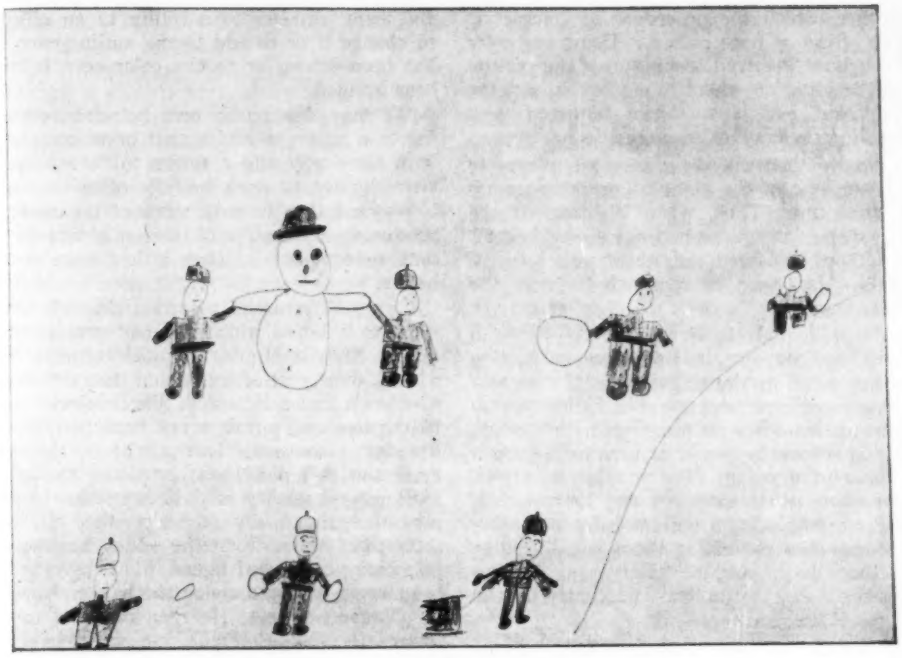

FIG. 2

in a study of their procedure in applying the colors.

Wo drew three figures first in outline. He then colored part of the first one with blue and turned with this color to the second one. He thus used black, green, orange, and brown on this figure, but not quite completing it, for he turned to the first figure again and used red, orange, and brown, still leaving it incomplete. He then used violet on the third figure, a snowman. Then returning to the first figure with yellow and orange, he applied these colors to the second figure, which completed it. He then returned to the first figure with brown and finished it with a shirt of several colors.

Gl (see Figure 2) drew seven figures and a snowman. The outlines of six of these were drawn completely, and he then turned to applying color to them. The first figure (lower right) was colored completely, using three colors. He then used white throughout—on the snowball and snowman. Then black was used to draw the snowman's hat, completing this figure, and used on two other figures. Then brown was taken up and used throughout on the pants of two figures and the shoes of a third. Then red was used on the hat, sleeves, and belt of three figures, and blue on the hat and pants of two others. A yellow belt was given to the figure nearby. Two figures were not completely colored; the other four needed to have their shirts colored and these were filled in with three colors used one at a time in the three figures. Finally, white snowflakes were put in all over, and the seventh figure (on the hill) drawn in outline and colored as a unit.

The order in which the colors were used when all the outlines are drawn first may be a "resultant" of several interests. First, the attraction of completing a figure or object in all its colors and not leaving it incomplete seems to have been present in quite a few. This was the general practice as compared with the use of one color a f t e r another throughout all locations. Here the attraction was to the figure at hand and its completion as a unit.

Then there may have been an attraction is using the crayon-in-hand throughout the work rather than putting is down and picking up

another, which the procedure of completing each object at once calls for. Using one color throughout involved looking over the picture and deciding on where to employ it, but the child did not have to be bothered with handling the crayons so often.

Finally, there may have been a tendency to take up one of the eight colors not used up to that time. Thus, when *Wo* colored the snowman in violet, he had not used this color at all but had used six others rather extensively. Also, the yellow which followed the violet was "new."

The full analysis of these "interests" and their inter-play in the procedure of putting in the color in drawings such as these requires more experimentation including the determination of the habitual procedure of an individual over a period of time in making a number of drawings. The problem is to determine to what extent a way of coloring, such as completing a unit or using one color throughout or combining these, is habitual or whether the procedure changes as various "interests" or attractions fluctuate in the course of the drawings.

Surveying the procedures followed, it seems that the tendency was predominant to complete a figure at once in outline and color rather than to build it up gradually at different occasions. Eight subjects drew outlines and applied colors one figure at a time. Of those nine who drew the outlines of all the units first and then turned to coloring them, the major impulse was to complete figures entirely, one at a time, rather than to leave them incomplete and work over the drawing. Only one subject, *Th*, adhered to this latter usage throughout. All the others completed figures by use of several colors at one time or another, perhaps mixing this way of working with single-color-throughout practice. Even *Gl*, who used one color in many places on several occasions, drew one figure complete at the very beginning and finished one other figure and the snowman before applying the last round of single colors.

We noted above that the schematic outline is usually drawn directly and precisely. Analysis of the records shows that it was very unusual for a child drawing figures at this level to return to a figure or object or to alter it after it has once been put down. There was, of course, a return when the color was applied later on, as we have been discussing. But here we refer to a return to an object to change it or to add to the outline once it has been drawn or to the color once it has been applied.

We may distinguish here between returning to a figure to add a part or to complete it in some way and a return to "touch up," alter slightly, or work over for other reasons. We find that in only three of the twenty schematic drawings was there a return to a unit to complete it after it had once been begun.

Cu (6:6) returned to add a sidewalk and steps to a house which she had presumably left to draw a number of other objects. *Fl* (11:0) drew part of a tree and then returned to draw a figure on a sled. She then returned to the tree and put in a few branches. Then drawing a snowman in front of it, she redrew the sled and then completed the tree with more branches and lines of the trunk near the ground. *Ga* (8:2) returned to objects three times. First, he added hair to a previously completed figure. (This may have been suggested by drawing the hair and head of a second figure). He then returned to a figure after a considerable interval to add a red handkerchief. And he went back to a figure to put in facial details, when before he had merely made an orange disk serve for the entire face.

We seem to have evidence here of forgetfulness and indecision, especially in *Fl*. The majority completed their schemas in detail, passed on to others, and did not return to add.

This appears to be true of the schematic level Subjects also in retouching or altering their objects for other ends. Only four of the twenty went back to a figure or object to alter it in any way.

Nu (5:12) changed a blue hat on a completed figure to brown. After drawing the hat blue he drew a large house next to it and colored it in with blue boldly and then went on to other figures. The reason for the later change to brown is not clear. Perhaps he felt that there was too much blue in that part of the picture.

Wa (7:11) drew the outlines of the snowman and the ground-line in pencil at first. When the other figures had been colored, she went to the snowman and the ground-line and re-drew them heavily over again in crayon. *Ga* (8:2) returned to a figure with a lightly-colored orange face and made it

darker. *Fl* (11:0) re-drew a rope leading a sled with heavier lines.

An awareness of the "appearance" of the drawing is evident here, apart from the adequacy or accuracy of its statements. The interest shown in making some lines heavier, apparently to accord with others, is more than a desire for accuracy, it is indeed a consciousness of the *looks* of the drawing.

Spatial Representation and Compositional Form: Before studying the drawing order for the whole composition, we analyze the spatial representation and the forms of compositional arrangement.

The topic or subject of the drawing, "children playing in a park," required that the child make some approach to the presentation of a scene, or at least, make a graphic statement of "who" or "what" were "where." We find, as others have done, that there is a gradual development from the a-visual spatial conceptions of the schematic level to the visually realistic scene of the older child. There is a slow change from an aspatial disposition of units to a form of spatial organization marked by linear and aerial perspective, overlapping of forms and diminution of size with distance.

Within the drawings characterized by the schematic form of figure, there were discernable a number of different forms of spatial representation and a slight tendency is even apparent in some toward the visually realistic scene.

A form frequently found in schematic drawing was that wherein there is an absence of spatial relations, as we conceive them under the influence of perspective. The units—figures, sleds, trees, snowmen, and rocks—were disposed over the page without reference to a ground-line or plane. There was no diminution of size, nor over-lapping, and the figures were usually drawn in frontal or profile aspect. One subject, *Gl* (7:6) drew in this manner (see Figure 2).

A number put down a line indicating the ground and located the objects directly on it or beside it. The units placed in a single row across the page. Seven subjects drew in this form: *Wo* (6:8), *Fr* (7:4) (see Figure 3),

FIG. 3

Ja (9:6), *Ga* (8:2), *So* (12:1), *Gp* (6:8), and *Ha* (9:5).

There were some drawings essentially of this form, but in which the units were definitely disposed *beside* or *not directly on* the ground-line. However, their locus near to this line brings them close to this general type. This off-line placement is not to be taken as an *attempt* at the row form, but rather as an approach to a compositional rendering more "natural"-appearing and freer—it is the beginning of the approach to the representation of depth. Five subjects disposed their units in this way: *Sh* (7:8), *Nu* (5:12), *Kn* (7:6), *Wa* (7:11), and *Th* (9:3).

In their attempts at the depiction of a scene, some children utilized a form of spatial representation which is characteristic of Persian painting and miniatures. A horizontal line was drawn very high on the page, and objects, without foreshortening, were disposed across it. The more distant objects were at the top. There was generally no diminution, but some drawings may show it. These drawings give the impression of objects situated on a plane surging up and back sharply from the bottom of the page. No sky was given. Three Subjects used this form of spatial representation: *Fl* (11:0), *Gz* (8:0), and *Mc* (9:9).

A form of representation further advanced toward the complete-perspective usage and its qualities was the multi-planar, wherein a number of ground-lines are found, one behind another. They formed successive planes like protruding wings on a stage. Objects were placed on them but never between them, and there was no direct connection between them. Planes and objects over-lapped, and there sometimes was diminution in size. Four subjects used this form: *Kl* (11:9), *Jo* (8:8), *Ha* (6:6), and *Cu* (6:6) (see Figure 4).

We turn now to the manner in which the units were disposed on the page, *regardless of the manner in which spatial representation was handled.* We find a number of different compositional or organizational Forms. These are listed in Table III (page 181), which gives the frequency with which they

FIG. 4

appeared in drawings of the various representative levels.

One subject, *Nu* (5:12) located his units in a disorganized manner (Form I). Although the lower line of units showed it to be close to the row organization so common to the schematics a figure on a sled on a hill-line above it gave the whole a disordered look.

Two subjects, *Jo* (8:8) and *Th* (9:3), disposed their units in an even distribution over the page (Form II). The items were neatly spaced apart in somewhat of an all-over distribution, and we cannot say that they were disorganized in the same way as *Nu's* drawing was.

The location of items in rows was the major compositional form of the schematics. There was evident a strong tendency to locate items in horizontal row or rows across the page (Form III). Some of these placements are neatly ordered with reference to a center. Some have a unit in the center with one on each side flanking it in a balanced manner, while others have two units balanced across a central axis. Most of the schematic compositions of this form have a tendency to be balanced about a central axis. Six subjects showed this form of organization: *Ga* (8:2), *Gp* (6:8), *So* (12:1), *Cu* (6:6), *Wa* (7:11), *Wo* (6:8), and *Ha* (9:5). *Cu* (see Figure 4) was the only one in this group to show an asymmetrical but balanced organization.

A number drew the units in a row, but in a definitely disordered and uneven manner. Here we have *Ja* (9:6), *Fr* (7:4) (see Figure 3), and *Sh* (7:8). And two subjects, *Gz* (8:0) and *Gl* (7:6) (see Figure 2) placed their figures in two rows, one above the other.

In these drawings the locus of units was in a single level across the page or in an evenly spaced all-over distribution. We also find a form, (Form V), in which there was a combination of the row and the all-over distribution. There was one schematic subject showing this form, *Kl* (11:9). Two figures on sleds occupied the lower middle of the page, while above them, evenly distributed in an all-over manner, were a number of figures playing in the snow, sledding, and standing.

There is apparent here a tendency toward a form of spatial relation such as we have mentioned above. When items were placed off the ground-line, the problem of ordering them entered in. This subject *Kl* apparently kept to the row form for two major items, and then drew the others, diminished in size for the distance, in a distributed form of placement.

Two other subjects *Fl* (11:9) and *Kn* (7:6) placed some of their figures and objects *off* the ground line (Form IV). In doing so, they disposed them in a balanced form around a central axis. In *Kn*'s drawing a large tree at the right and a large house at the left flank a small figure of a child in the lower middle region. *Fl* drew two trees at the sides and a sled and a figure on another sled in the center.

In the drawings analyzed above there had been no attempt to organize units into independent groups. Figures and natural objects had been disposed evenly and independently over the page. We found, however, two subjects attempting a form of composition much more characteristic of the older children of the true-to-appearance level (Form VI). *Ha* (6:6) drew a figure on a sled in the center of the page and on each side of a group of trees, smaller than the figure and grouped in a cluster, four on the right and two on the left. *Mc* (9:9) drew a hill-line running from the upper left to the lower right-hand on which a figure is sledding. On the right side are six trees.

Both these cases seemed to be attempts at drawing a composition in which groups of figures or objects formed a unit, and several of these together made up the whole, this was the case with *Ha*, while definite sections created by the diagonal formed by the picture by *Mc*. These compositional forms we will find much more common in the visually realistic drawings.

Schematic Style of Drawing. Looking over the schematic drawings, we find characteristics common to them all in the style of drawing and treatment of objects. As we have shown above, the schematic units were stated in a precise and definite outline, which was then usually colored uniformly within. The figures or objects were given in firm outlines with no attempt to indicate roundness of form or to differentiate between textures. Trees and clothes had the same type of outline and areal treatment.

We also noticed that units are almost always given in their complete form. It was unusual for an object to be given cut-off by the edge of the paper. Only four children of schematic level allowed this to happen to

their units and these were older then most. *Kn* (7:6) drew a tree in a corner where the edges of the paper cut off part of the leafy top. *Gz* (8:0) did the same thing with a row of trees which were cut off at the tops. *So* (12:1) drew only a small section of a tree, and *Kl* (11:9) drew but one-half of a body and sled, the rest being off the paper.

This tendency to present the whole outline of an object appeared to be related to another characteristic, that of spacing objects independently from each other. For the most part, there was no feeling of relationship between the figures or objects. Each unit was put down "statically", as it were. Though some were related in a more or less balanced organization or in an approach to a group, the character of *discreteness* pervaded the whole.

Another noticeable characteristic is found in the equal emphasis given to all objects. There was, at this level, no diminution of size for distance, but further than this there was no strong contrast between objects in size or treatment. Trees were scarcely bigger than humans and all are drawn equally emphatically with a hard firm line.

There was, further, a minimum of landscape. Trees, bushes, and rocks might be shown, and the ground indicated by a line or a flatly colored area, but there was no feeling of the drawing being a landscape containing humans, nor did the ground in its contours make up a compositional pattern or serve to bind or relate objects.

From our survey of these drawings, then, from the varied standpoints of spatial representation, organization of units and style of drawing, we are led to a characterization of them as follows:

1. Units were definitely and precisely stated. Their outlines were clear and hardly ever violated by the edge of the paper. Units were, in most cases, about the same size, and all figures and objects were given equally specifically and definitely. There was no emphasizing through heavier treatment, light-effects, or organization.

2. Units were located on the page independently of one another. They were generally found in a row or rows across the page or in a broadcast distribution. They usually either filled the space over the page or took up all the room in the row. Objects do not appear to be related in groups.

3. The style of drawing was a precise and specific "stating" of outlines. There was no interest manifest in light-effects or textures. All units were given in hard and specific outlines and flatly filled in with color.

4. There was a minimum of landscape, and the ground was usually represented by a line or a solidly colored area.

All in all, the drawings consisted primarily of fixed and independent schemas—figures or objects—in a disposition only roughly resembling a scene and located in the minimum of surroundings.

Drawing Order. Analysis of the records showing the stages of construction of these schematic drawings shows that there were a number of different ways of working.

In the drawings of the compositional form wherein units are uniformly dispersed (Form II), we find that a *spotting* procedure was followed. The Subject did not progress in an orderly manner, but worked from one unit to another, placing them in "empty" spaces. The child would put down one figure—generally near the center—and follow it with a second in one part or another of the space remaining. A third item would follow in another available spot, and so on. There is a moving back and forth across the page, spacing units carefully and hardly ever showing them as touching or overlapping.

This procedure was followed by *Jo* (8:8) and *Th* (9:3).

We find this manner of working in the drawings of the row form (Form III). *Ga* (8:2), *Cu* (6:6) (see Figure 4), *Sh* (7:8), and *Fr* (4:4) (see Figure 3) placed their figures and objects in a row. They were, however, not drawn in order from one side to the other, but the Subject worked back and forth along the array.

A number, however, did work *serially*. Usually this procedure was followed in drawings which contained a smaller number of elements. *Wa* (7:11), *Wo* (6:8), and *Ha* (6:6) of the single row-form worked in a serial order across the page from one unit to another. Two subjects worked from the right side, and two from the left.

This manner of working was found also in the two drawings of the double-row type done by *Gl* (7:6) (see Figure 3) and *Gz* (8:0). *Gz* drew the two figures in the lower row and then drew the trees in the upper section working orderly from the left to the right in both

rows. *Gl* worked from the lower right across the lower section, drawing three figures. He then moved to the upper row and worked toward the right, drawing in this series four figures and a snowman.

Two drawings of the row-form contained only two units. These, drawn by *Gp* (6:8) and *Ja* (9:6), can hardly be said to be drawn either in the serial or spotting techniques.

Turning to compositions in which figures and objects are placed singly in an arrangement over the page, in contrast to the row-order (Form IV), we find that the procedures followed in drawing them by the two subjects showing this form were quite different. Although *Fl*'s (11:0) composition was quite well balanced, her method of procedure was highly irregular and in decided contrast to *Kn*. After drawing and erasing a ground line, it was placed higher on the page. Then a tree-trunk at the right was drawn, followed by a figure and sled in the upper center. Then a sled in the lower center was drawn in, and there was a return to finish the first tree's branches. Finally, a snowman was drawn in front of this tree, sled ropes were re-drawn more heavily, the tree completed at last, and the composition finished with another tree at the left.

Kn proceeded in a steady and orderly progression: tree at right, clouds above, ground-line or horizon, figure in the lower center, and then the house at the left. Though there were not sufficient items to make it certain that a regular progression was being followed—somewhat of a serial type—the manner contrasts with the spotting of the subjects which we described above and appears very precise and definite.

The drawings of *Ha* (9:5) and *Mc* (9:9) were mentioned above as being apparently attempts at forms of composition in which objects are grouped or placed in sections of the page. And here we find that *objects in groups were generally drawn at the same time. Ha* drew the central figure, then two trees at the left and then four trees at the right; each group of trees was drawn completely at one time. *Mc* did likewise, drawing the figure on the sled on the hill and then the trees at the right. These were drawn in a serial order in three rows. This form of drawing we term *constructive:* the subject works from group to group or section to section.

In surveying these drawings and the manner in which they were drawn, we find that in most drawings at this level the process consisted in putting down independent and discrete units, either by proceding regularly across the page or by a spotting and jumping-about technique. When the drawings showed units in groups, all those in a group were drawn at the same time.

The serial manner is easily understood. The child simply starts at one side and works across. When, however, there were a large number of items in the drawing, we generally find that a spotting procedure was followed. Here the subject works from one available space to another, until they are all occupied. (One child, drawing in this way, said, "All finished now; no more place to draw in.")

In some cases there was action between the figures. Two figures would be shown exchanging snowballs in a fight. In all cases these units related were drawn consecutively.

All in all, the spotting manner was the most frequently followed in drawing in this schematic-level group where there was no grouping of items apart from others, or a feeling for sections of the drawing as more or less independent. Serial progression was second in frequency and a combination of the two occurred once.

In drawings of the type with such a group organization, we find that these groups or sections are drawn one at a time. There were two attempts at this type of compositions in this representative level group, and this procedure was followed by both subjects.

Mixed-Schematic Level of Representation

Spatial Representation and Compositional Form. The transition from the schematic type to the visually true-to-appearance is gradual, and we find an intermediate form which combines some of the features of both. This has been termed the mixed-schematic level. The figure combines some of the characteristics of the schema, such as inaccurate shapes of limbs and inaccurate bodily proportions; it displays some of the visually-realistic-level qualities in that the limbs are jointed more correctly. Some children are able to represent the figure in a turning position, whereas the schematic figure is almost always in frontal aspect or profile.

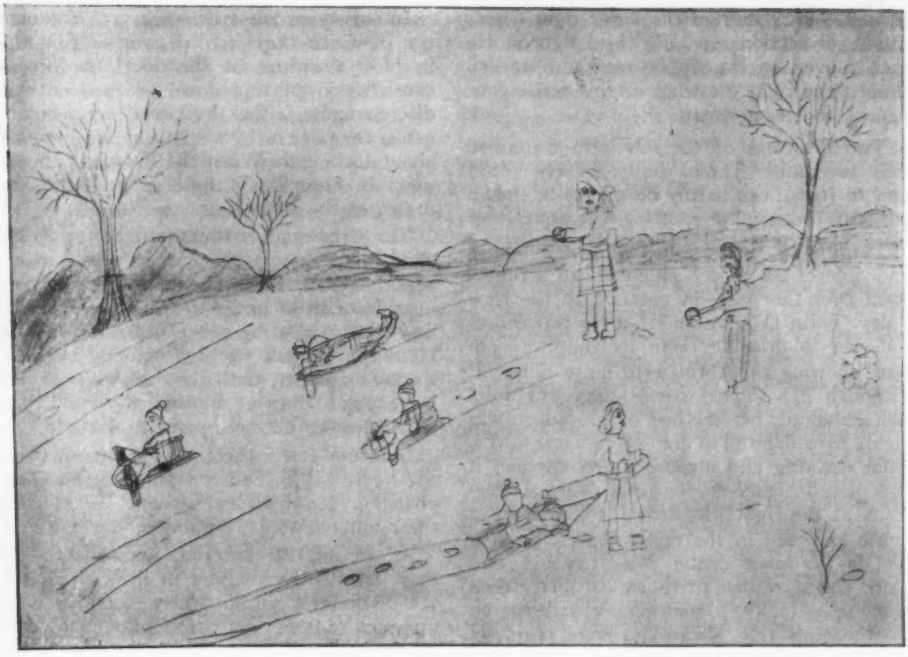

FIG. 5

We found the same types of spatial representation used as in the schematic group. At this stage of development, the child was fairly well able to handle the multi-planar form, but was still unable to cope with the problems of perspective in the more developed visually-realistic scene.

In compositional form we found one drawing disorganized (Form I), by *Ri* (10:8); one of the evenly-dispersed form (Form II), by *Wo* (13:8) (see Figure 5); and one of the disorganized row type (Form III), by *Ba* (8:1). There was one drawing with only one figure in it, *Ku* (9:5).

But the two compositions of the organized-group form (Form VI) showed a decided advance over the schematics in handling this type of organization. In the drawings of *Fr* (8:6) and *Te* (13:7) (see Figure 6) we found evident a feeling for groups unified within the whole composition.

Fr's drawing showed a group of three figures around a picnic cloth and dishes with trees to right and left and a row of bushes in the front. *Te*'s drawing (see Figure 6) showed three fairly distinct and unified sections. There was a lower right-hand group of trees and figures, which were playing at snowballs; there was an ice-pond and skater at the left; while in the upper right-hand and left-hand were two figures exchanging snowballs across the page, with a hill, an igloo, and a sun in the center-distance.

We found, then, in this mixed-schematic group several drawings showing tendencies which were not characteristic of the schematic level and which appeared to indicate a definite change of interests. Some children, however, appear to have persisted in their general method of organization and compositional form and remained very close to the schematic level types; and they varied only from these in that their figures were more advanced toward the true-to-appearance in representation.

In compositional form we found two subjects interested and able to organize units into unified groups within the whole. This form of organization contrasted sharply with the dispersion of the schematic compositions in "wooden" row-placements or dispersions.

FIG. 6

Stylistic Changes. In analyzing the style of drawing of these mixed-schematic-level compositions, we find evidences of considerable difference between it and the style in the schematic-level drawings. In the schematic level group we found that figures and objects were drawn with a hard outline, precisely and definitely given. Here with the mixed schematics we found the outline becoming looser and freer; it did not dominate as much; and the style of drawing was approaching a sketchy or impressionistic technique. While the usual method of drawing in the schematic stage was to delineate by an outline, we find that in some cases in this group the contour was given by a series of light, short, sketchy lines. The lines are lighter and less decisive than the heavy and decisive schematic outline. There was evident, moreover, an interest in differentiating between textures. Hair was given a different stroking from parts of the body or clothing. Bends and folds of material were reproduced fairly well. Trees were not drawn as outline with filling, but were sometimes built up by a series of short, light strokes revealing the characteristic roughness of the bark and trunk.

We have a change here from the precise, heavy and "characterless" *outline* to the sketchy and light *contour* which revealed the nature of the object. Though superficially similar there was a basic difference between them. The outline was rigid, solid, and not informative of the nature of the object, while the contour was altered at will by the artist, was light and flexible and revealed the surface characteristics of the object.

The change of style was evidence of a change of interest. We have spoken of the gradual transition toward visually realistic scenes. Here we found it coming out fairly strongly. Objects were beginning to be drawn to show the play of light and shade, characteristic textures, light and dark effects, and the like. Distant objects were given less accurate a form than those nearer.

This change in interest was shown also by the almost complete abandonment of crayon color. While seventeen of the twenty schematic drawings showed a color application within the forms, only one individual in the mixed schematic and true-to-appearance stages used crayons. Perhaps this was because the child feels unable to handle colors in a

realistic and "relative" local-color manner, as distinguished from the absolutistic color usage of the schematic. Also the pencil was a more flexible and delicate tool for the impressionistic style and the following of contours.

In this group of mixed schematics we find one subject, *Ri* (10:8), who used the precise, schematic style throughout. Three others showed very slight traces of the impressionistic style and retained strongly the schematic outline and areal filling. *Ba* (8:1) drew outlined figures, but his line was looser than was usual, and a tree shows a very free line and shading on the trunk. *Ku* (9:5) drew very fuzzy clouds in a smudgy manner. *Wo* (13:8) (see Figure 5) drew figures in outline but made a distant row of bushes in a very amorphous manner with sketchy outlines and solid shading.

One subject, *Fr* (8:6) is best described as showing a style transitional between the schematic-precise and the impressionistic. Her figures were drawn quite loosely. Bushes and trees were put down in a very light and free style, almost a short-hand.

The sixth of the group, *Te* (13:7) (see Figure 6) used a thoroughly impressionistic technique. Shapes had indefinite edges and were built up with many overlapping short lines. The ground was given by hatching and criss-crossed treatment. A tree was drawn with texture of trunk evident and was graded to indicate roundness.

There appeared to be considerable difference between these styles in the frequency with which the artist went back to a figure or object which he had been working on and had left for something else and in the motivation for it. We found with the schematics that the style of drawing was precise and definite and the reverting to a figure to alter a part was not common. The retouching was generally in the interests of accuracy and clarity of definition.

Typical of this interest we find *Ri* in the mixed-schematic group touching up and redrawing the face and legs of a figure to make them more accurate.

But in the impressionistic style we can no longer regard the returning to a figure as a re-touching of this sort. For the whole drawing might be built up in this manner. A figure or form would be sketched in lightly and built up in heaviness of line and general character, along with other objects. The character of the units was not precise as with the schematics. They were more suggestive and dependent on their surroundings and context for their character.

Of the three who showed traces of this sketchy manner, we found that returning to an object was for quite different reasons than for accuracy of detail. *Ba* (8:1) returned to re-draw a foot to make it heavier in darkness and re-drew part of the ground-line in the same interest, having drawn these lines very lightly to start with. *Ku* (9:5) re-worked his figure, re-shading parts of the body and face at the close of his drawing period. *Wo* (13:8) consumed the last part of her drawing period in working over the drawing. She re-drew the feet on two figures and altered their position —a change in the interest of accuracy. Part of the ground-line was made more precise and heavier than the light first statement. The hair on one figure was made thicker and a bit more added to another. The sleds were shaded, which were drawn only in outline first, and shading was added to the ski pants of another figure previously left unshaded.

Fr (8:6) showed a considerable amount of erasing and replacing of items, and alteration of outlines. Some of her interest in returning to figures was to secure uniform effects and, as with *Ku*, actually to draw the object by successive shadings.

Te (13:7) (see Figure 6) showed a much freer initial drawing. Toward the end of the drawing period, he worked over a tree, a considerable part of the ground, sled tracks, a hill at the right. This re-working changed the character of the objects and parts thus worked on and brought them into accord with the style used throughout the rest of the drawing.

It appears then that in this group those subjects who used a precise schematic style retouched mostly for the sake of accuracy and clarity of statement; those whose style had tendencies toward the impressionistic showed an interest both in accuracy and in "building-up"; while the impressionistic-style subject only returned to build-up and to bring the whole to a similar quality or consistency of style and handling.

One factor here was the adding of shading and "roundness" to figures and objects. This introduced the problem of securing an equal degree of light and darkness throughout the whole work. We have, therefore, a going-over

of objects to achieve a uniform intensity and avoid a scratchy appearance.

In connection with the style of the drawing, we found that it was unusual for a schematic-level item to be drawn only in part, cut off by the edge of the sheet. In this mixed schematic level group, we find more subjects showing a lack of concern with the presentation of the whole object. *Wo* (13:8) drew a row of bushes cut off by the page's edge; *Ba* (8:1) drew only part of a cloud; *Fr* (8:6) allowed a treetop to be cut off; *Te* (13:7) drew only the lower half of the sun and part of a tree was missing.

There is, as was implicit in our discussion of the sketchy style appearing at this level, a lack of concern for the definite statement of objects. Instead of being concerned with an accurate statement of their outline, objects were beginning to be given by intimation and suggestion. A row of trees would not, as with the typical schematic, be represented by a series of discrete, independent and neatly-spaced units. They might be drawn as a solid mass showing a "tree-like" contour and with an occasional branch or trunk evident.

There was evident a considerable amount of uncertainty and indecisiveness in handling the representation of objects and scenes at this level and in the visually-realistic stage which follows. But we could not attribute the effects which we describe here solely to this. In most cases it was not hard to determine whether a figure has been drawn sketchily from lack of facility and uncertainty or from a desire to achieve an impressionistic effect. The majority of these drawings showed a tendency toward this style of handling, a slight impressionism.

In surveying these drawings, we found changes from the schematic level in a number of regards.

1. The units were not so precisely stated. Their outlines were often hazy and indefinite. They might fuse into one another, as a row of bushes or trees. There was less of a concern to maintain their identities intact and independent.

2. There was more of a concern to relate units. The compositional form in some cases showed definite groups or sections which had a common activity or relationship.

3. The style of drawing was beginning to be impressionistic and sketchy. There was beginning to be an interest manifest in light effects and in representation of different textures. Units were no longer given in outline and flatly colored. There was a tendency to round shapes and give a three-dimensional effect. While there was evidence of indecisiveness in handling the pencil, there can be no doubt but that a different style was being aimed at than that of the schematic level.

4. Landscape was becoming more important and the nature of the ground was often represented with various kinds of treatments.

5. The spatial representation was approaching the visually true-to-appearance with diminishing size of objects.

Drawing Order. Turning to an analysis of the order in which these drawings were constructed, we find that those subjects whose drawings were of the dispersed form and schematic style followed procedures characteristic of the schematic compositions. *Ri* (10:8), *Ba* (8:4), and *Wo* (13:8) (see Figure 5) followed a spotting procedure. *Ri*'s units were disorganized; *Ba*'s were ordered in a row; and *Wo*'s were dispersed. All followed the spotting procedure. (*Ku* (9:5) drew only figure in a scanty landscape which was drawn last).

When we turn to the two drawings in the organized-group form drawn by *Fr* (8:6) and *Te* (13:7) (see Figure 6), we find evidence of the constructive procedure which was noted above with two schematics. Instead of working across the paper in a serial manner or spotting from space to space, both these subjects worked from group to group, or from figures to setting, in a systematic manner.

Te drew a hill, a figure, and tracks in the snow at the center of the right side, forming a "unit" or "section" in themselves. He then went over to the center of the left side and drew a figure on a hill. Returning to the lower right, he drew a group of figures, a pile of snowballs, and a tree, and then proceeded to the lower left corner drew a figure skating on a pond. After working over the first group, he returned to the center of the page and drew the sun, atmospheric haze, a distant hill, an igloo on it.

Fr drew the three figures around a picnic cloth spread out on the grass first as a group. She then drew the bench and figure at the upper left and the sky across the whole scene. The tree on the right followed, then that on the left, and the drawing ended with the ad-

dition of a row of bushes across the lower portion.

We find several different procedures at this mixed-schematic stage. Some are working in the analytical procedure characteristic of the schematics; while two, whose compositions group units together, work in the constructive manner. Here, instead of additive spotting, we find a building-up of the picture of developing various subsections which are drawn as units one at a time.

Visually Realistic Level of Representation

Spatial Representation and Compositional Form. The representation of figures in the true-to-appearance stage or the visually realistic level, which is the stage of development attained by most children from eleven years and older, represents the culmination of the drive toward visually accurate drawing. Figures are approximately true-to-life in proportion and articulation. We also find that they, as well as other objects, are drawn as if seen from one point of view. There is at times correct use of foreshortening, and perspective may be attempted or even used correctly.

Space is represented more or less accurately, as it would appear to the eye from one vantage point. Linear perspective is sometimes handled correctly; objects diminish with size and overlap. The multi-planar form of spatial representation generally gives way to the implicit planar, where the surface of the ground is drawn as retreating into the distance toward the horizon.

Analysis of the compositional form of these drawings showed that while a number retained the forms characteristic of the schematics, the majority attempted or achieved a compositional arrangement of groups or sections. *Du* (11:8) disposed the units in a disorganized manner. Two subjects, *Mo* (12:6) and *Ka* (14:4), dispersed them evenly over the page. *Sa* (10:4) and *Sm* (8:8) organized in a row, and two others, *Ma* (15:6) and *Sc* (13:8), used a double-row form of composition.

Of the schematics using the row form of organization, the majority balanced the units, placing a number of them of equal size in a neatly placed symmetrical arrangement. Only one of that group used an asymmetrical balance. The two drawings of this visually-realistic level were, however, of that type, with a group of figures off-centered but balanced.

Though we have classified *Sc* as being in the double-row form, his extremely sketchy style, in which objects became almost fluid and dissolved, gives it a distinctly different appearance from the examples of this form among the schematic-level drawings. However, his drawing consisted of a foreground, a distant ground, and row of trees, and above this a row of buildings. In *Ma*, though we find a row of houses across the upper part (rear) and some objects—a house and a figure—in the lower part (near distance), there is a unifying diagonal direction throughout it which makes it also of decided contrast to the unrelated schematic compositions.

We have described above the various forms of spatial representation, and how there was a tendency shown with age toward a visually-realistic type of disposition. This generally took the form of a multi-planar or implicit planar form, in both forms of which objects were given in depth higher on the page and "above" those nearer and lower down. This marked a break away from the row alignment of the typical schematic arrangement.

In these visually-realistic drawings where this had occurred various types of organization had been attempted. In some cases the subject had successfully achieved a grouping and organization; in others, he had failed.

One attempt resulted in an arrangement (Form V-A) of which we have already had one representative among the schematic level, *Kl* (11:9). In this drawing a number of figures have been drawn in a row across the front and another group dispersed "behind" them, that is, "above" on the page. Four subjects showed this type of arrangement in this group. In *Fi* (10:9) a confusion existed in the manner of showing depth in the two groups—the lower row were drawn in foreshortening, and the upper were drawn as if seen from almost directly above. In the other three, *Bk* (16:6), *Ko* (14:9), (see Figure 7), and *Pe* (14:7), there was no mixture of representative devices, but a lack of relation between the two groups.

Closely allied to this form is a type in which we found a group of figures in the lower center with an unrelated row-type disposition in the rear (Form V-B). *Br* (13:5) (see Figure 8) and *Be* (12:6) showed this form, especially the former's drawing.

A large number succeeded in organizing groups in one way or another, using one of the forms of spatial representation, either "Persian" or one of the planar types, or a combination of them (Form VI). There were three major forms here: a trifold arrangement, symmetrical and balanced about a central axis; a diagonal arrangement with two sections on each side of a dividing diagonal line; and an organization of units in a "key-figure", such as a circle or triangle.

Two drawings, by *Ca* (10:10) and *Va* (16:10), showed an attempt at the center-organization arrangement (Form VI-A). In *Va* (16:10) the group of figures in the center appeared but slightly related. In *Ca* two figures, each backed by trees and one by a house, faced each other across an empty space marked only by two ground-lines crossing.

Three subjects, *Ro* (14:7) (see Figure 9), *Cr* (12:7), and *Ba* (12:11) achieved a unification of groups in this form. *Ba* drew three houses, bushes and two trees in a balanced symmetrical arrangement with a group of children playing in the lower-right corner. *Cr* represented a figure on a sled and a snowman at the right facing a sloping road with a tree, basket and stump at the left and the road winding off to trees and clouds at the distant horizon. *Ro*, where the organization was especially clear, drew two trees framing in lower center a boy and a sled and in the upper center the tops of a city's buildings in the distance.

The diagonal form (Form VI-B) was attempted by five and succeeded in by three. *Ps* (14:7), *Co* (15:4), *Wi* (11:7), and *Fr* (11:5) utilized a diagonal hill-line and an organization of objects on it and in the parts it subtended. But *Ps* left the right part entirely vacant; *Co* ordered the city buildings, figure and trees grouped at the right, but the figures and objects on the left are more or less haphazardly disposed; *Fr* neglected the right section also.

The successful achievement of this form was performed by *Bu* (12:9), *Ho* (15:0), and *Sy* (14:11).

The key-figure form (Form VI-C) of organization was used as a basis by *En* (14:4). A group of children are shown in a more or less circular group, backed by buildings and a few trees and bushes.

Surveying the whole group, we find that a majority of children at this representative level had reached a stage where they represent depth through receding planes and where objects higher on the page were further away. In breaking away from the row form, still used by a few, the subject was confronted by the problem of organizing the units on the page.

We find a transitional form between the row and the unified "above-and-below" form in Form V-A and an approach to grouping in Form V-B. In both these types of arrangement there was a breaking-away from the single horizontal row-order to a dispersed yet unified type. A large number approached or achieved organization of groups of units in one form or another (Form VI). This appears to be the characteristic type of disposition at this level as contrasted with the schematic.

Stylistic Development. In the mixed schematic group we found a tendency toward a sketchy and impressionistic style. This was carried further in the drawings of this visually realistic group. Table II indicates the frequency of occurrence of these styles in the three representative levels.

TABLE II

FREQUENCY OF OCCURRENCE OF DRAWINGS OF VARIOUS STYLES IN THE REPRESENTATIVE STAGES

Style	Representative Level: Schematic		Mixed Schematic		Visually Realistic	
Precise-schematic	20	100%	4	66%	4	15%
Transitional-impressionistic	—	—	1	17	10	39
Impressionistic	—	—	1	17	12	46
Total	20	100%	6	100%	26	100%

A number at this level retained the *precise-schematic style*. Figures were drawn in outline and, if filled in at all, were done so uniformly. This group was composed of *Ko* (14:9) (see Figure 7), *Mo* (12:6), *Wi* (11:7) and *Bk* (16:10).

Ten of the group, about one-third, showed a *transitional style* of drawing. The hard outline gave way to a sketchy and softer, at times, more irregular, one. All lines were not given with the same emphasis or showed the same character. There was a differentiation between edges of different materials, such as clothing, bushes, and body.

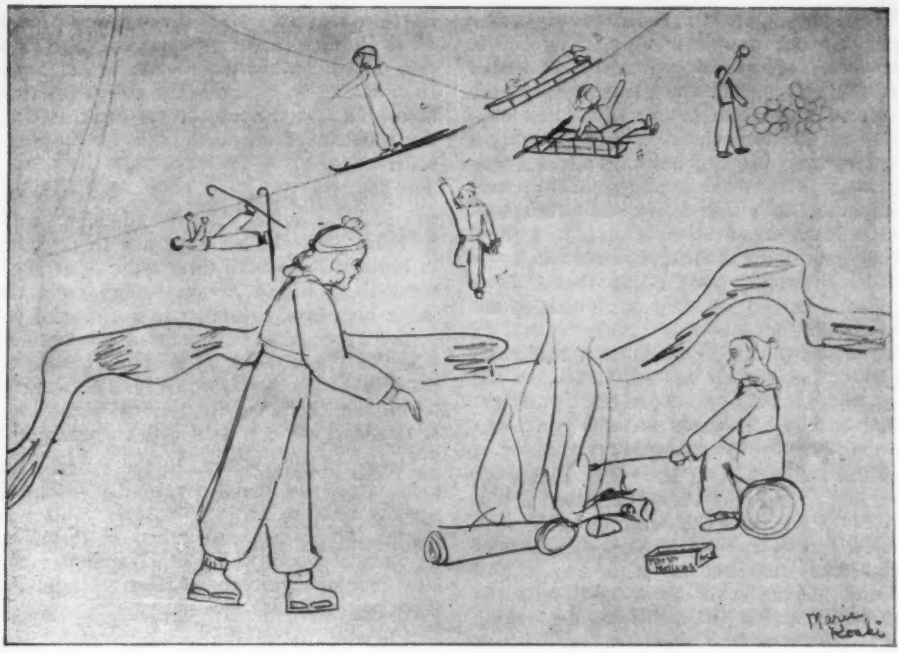

FIG. 7

There appeared to be two ways in which the outline-with-uniform-filling of the schematic style was altered. One form showed the outline firm but had shades within differentiatingly applied. The subject here was apparently trying to secure a roundedness of forms as opposed to the flat disks of the schematic.

We found this type in the drawing of *Du* (11:8) where tree-trunks and clothing were shaded, but limbs, faces, and a snowman were untouched. *Ba* (12:11) shaded in the round and gave a different quality to trees, bushes, houses, and the road. *Fr* (11:5), although he drew figures and colored them with crayon in exactly the same manner as did the schematics, did not draw them severely, and some units, bushes, and trees were quite sketchy. *Pe* (10:10) drew the figure and sled in hard outline, but the trees and house were sketchier and suggestive. *Pa* (14:4) drew a very sketchy tree and applied some shading along edges of the figures. *Br* (13:5) (see Figure 8) shows shading as well as a looser outline.

The second type of transition showed an interest in breaking down the outline. This was not given directly and firmly, but with a semblance of sketchiness and irregularity. *Ca* (10:10), *Co* (15:4), *Ps* (14:7), *Cr* (12:7), and *Sm* (8:9) showed this style of drawing, and all gave their objects slightly sketchy and broken outlines.

For most of these transitional-style drawings there was evidence of some uncertainty and indecisiveness in handling outlines, the result of an attempt at a form of representation not yet mastered. For those of the next group this had practically disappeared, and the sketchy style was fairly well handled. As we mentioned above, this style of drawing cannot be considered the result of uncertainty in drawing. It was a deliberate and conscious attempt to render objects and scenes in a quick and impressionistic way.

Twelve subjects, about one-half of the group, showed the *impressionistic style*. There were considerable differences between the individual styles of drawing, but all of them were similar in not having a definite outline for the figure or objects and in that they used a quick, sketchy manner of drawing. There were differences, moreover, in the extent to

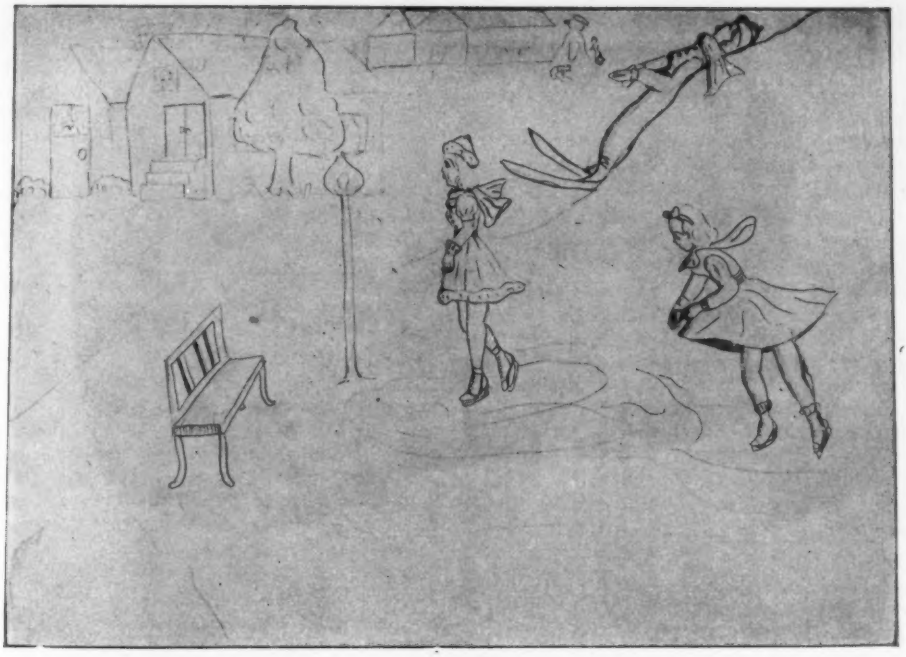

FIG. 8

which this style was used throughout the whole drawing. Some drew the landscape in this style and showed traces of the schematic manner in the figure. Others had reached the stage of using *in* throughout. (17)

These twelve were *Fi* (10:9), *Ma* (15:6), *Re* (12:6), *Sc* (13:8), *Co* (15:4), *Va* (16.10), *En* (14:4), *Sa* (10:4), *Ho* (15:0), *Sy* (14:11), *Bu* (12:9), and *Ro* (14:7) (see Figure 9)

Closely allied to the style is a matter on which we have already touched, the returning to objects after having once begun them and left them for some other drawing activity. We found in the drawings at the schematic level that a number of subjects returned to complete a unit by adding a detail, and some apparently went back to partially make-over or alter the appearance. In the mixed-schematic level we found some subjects, with a transitional style, returning to make alterations both for appearance's sake and for accuracy, while those with an impressionistic style went over their drawings to build up lines and objects to a desired quality or strength. That tendency was marked in the visually-realistic group with its relatively greater number or sketchy-style drawings.

In this group of the visually-realistic we find a number of drawings *with the schematic style* still used wherein there was a return to objects to add details and parts omitted during the first drawing or thought of later on. Three of the four drawings in this style, *Bk* (16:6), *Ko* (14:9) (see Figure 7), and *Wi* (11:7), went back to an object to add a part —a facial detail, a log in a fire, a ski on a figure, and a base to a tree left hanging in the air.

In most cases of schematics, as we found above, lines were put down definitely and allowed to remain unaltered. Only a few of the schematic-style subjects made lines over again more heavily or changed their character. Only, one *Wi*, re-drew a few lines over more heavily. There was no alteration in their character.

In the *transition style* between the schematic and the impressionistic style we found characteristics from both combined in various ways. The figures or objects were usually drawn in outline, but the lines were sketchier

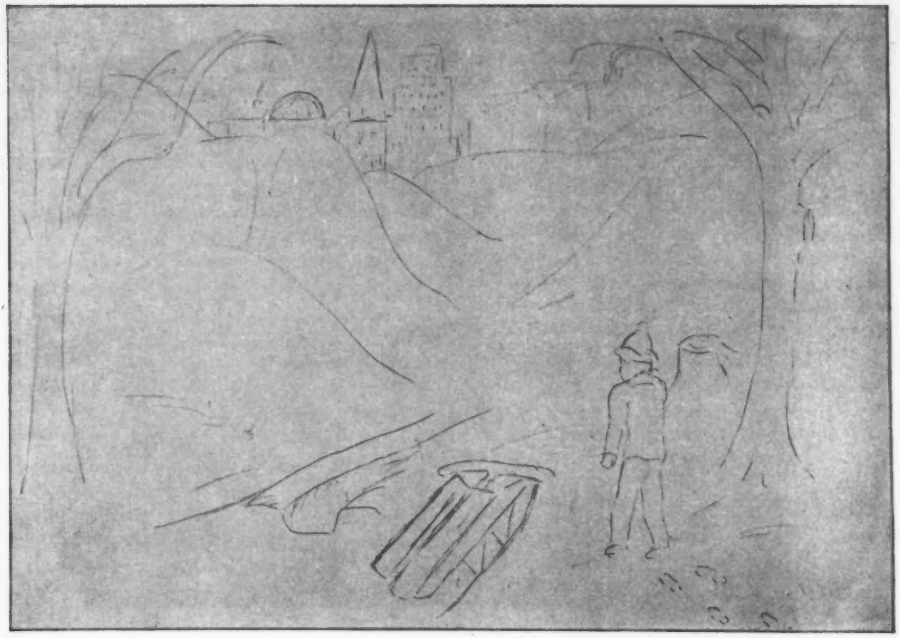

FIG. 9

and less definite and becoming more contour-like. There was more attention paid to the qualities of lines and areas. Instead of leaving the inner areas blank or uniform, they were often shaded to give texture or roundness.

Some of the subjects who show this transition style returned to add parts to units. *Ka* (14:4) added windows to a house, *Fr* (11:5) a scarf, *Pe* (10:10) runners to a sled. Inner-surface shading is more prominent than in the schematics, and we find several returning to figures to work on this. *Du* (11:8) reworked parts of figures intensively; *Ba* (12:11) labored over a head; *Co* (15:4) worked quite a time on a tree and ground; and *Pe* (10:10) worked on the ground.

Where the units were built up in outline, we found some concern with their accuracy. *Du* re-drew a part of a figure; *Sm* (10:4) re-drew shoulders and pocket of a figure; *Cr* (12:7), the branches of a tree; *Fr* (11:8), a face and body; and *Br* (13:5) (see Figure 8) re-drew faces, clothing, street-light and tree.

One point of contrast between this transition-style group and the schematic-style group lay in the greater amount of re-working on lines to make them heavier or to change their character in one way or another. Several subjects re-drew lines to make them heavier and more in consonance with other lines in the drawing. *Ba* (12:11) re-drew a road several times over, making it gradually darker and changing its character. *Fr* (11:5) drew hill-lines more heavily. *Pe* (10:10) darkened a large number of limbs of trees; and *Cr* (12:7), a figure.

There were also changes in the character of lines, both in outline and surface. *Ka* (14:4) re-drew the lines in a tree from simple light lines to fuzzy and feathery. *Ps* (14:7) made simple light road-lines more sketchy and less precise. *Co* (15:4) worked on the ground and re-drew a great deal, drawing light sketchy lines and building up the surface. *Ca* (10:10) changed and re-worked the surface of two trees, shading in round and rendering darker.

Turning to the group with a quite *developed and consistent impressionistic style*, we find that in no case was there any returning to objects to add a part. One returned to put some shading in a figure, *Fi* (10:9). There

were also relatively fewer returns for accuracy of any sort. *Fi* re-drew some hair on one figure; *Bu* (12:0) erased and re-drew a facial profile, and *Ho* (15:0) worked a while on the contour of a back; *Be* (12:6) altered the shading on a figure to bring out roundness more decidedly.

This relative lack of concern with clarity of statement is consonant with the impressionistic style, which is loose and free, and directed toward suggestion more than precision. It frequently proceeds by building up objects with a series of close lines which round forms and give s u r f a c e character, rather than by outlining the object before shading it.

The procedure in drawing, when this style was adopted, was not one that moves from one complete statement to another, but one which works over the units and ground. (In this connection it should be mentioned that there was much more attention paid to the character of the ground and landscape than in the other level drawings).

Of the twelve visually-realistic drawings of this style we found that three, *Sy* (14:11), *Ho* (15:0), and *Ma* (15:6), drew in a manner in which a unit or group or space of ground or atmospheric effects would be returned to constantly and drawn over and altered. This is not to be considered as the re-touching in detail of a completely formed unit, but as a moment-to-moment construction, a working-over and gradual forming.

Ma (15:6) showed this altering v e r y prominently. She drew a number of units in a light line and then went over them both to change these lines from light to dark and to change them from simple intact contour to one sketchier and less precise. She also shaded a group of objects with differentiating technique, then went on to another group, working in the same way and so on throughout the drawing, often returning to alter or sketch over or re-work lines and surfaces of the first-drawn group.

In seven other subjects' drawings there was some return to alter lines. *Fi* (10:9), *En* (14:4), *Ro* (14:7) (see Figure 9), and *Bu* (12:9) re-drew various lines more heavily. As did *Va* (16:10), also. *Sa* (10:4) did so, too, and worked over the ground by hatching. *Co* (15:4) changed the character of the ground to a fuzzier appearance. Two subjects showed no re-working after the first statement (*Be*—12:6; *Sc*—13:0). *Sc* drew in a very sketchy and fluid style and completed his drawing in between two and three minutes.

As we have noted above, there were considerable differences in style in this group. But all showed in one way or another a strong tendency toward an impressionistic rendering, which in its sketchy, brief, light handling, its emphasis on suggestions rather than precision, and its interest in recording visually-realistic effects of light—as shown in texture, atmospheric qualities—was in strong contrast to the schematic style and outlook.

Summarizing the characteristics of these visually-realistic drawings, we find that those tendencies which we noted in the mixed schematic stage had reached a full expression. There were, of course, a number of subjects who retained the schematic form and style, but the majority revealed a clear trend toward visually-realistic compositions.

The characteristics of these drawings were:

1. The unprecise statement of the factual details of objects, and an increased tendency to represent the visual appearance. Edges lost their precise character and took on a sketchy treatment indicative of rounding and effects of light and dark. Shading and textural differentiation were present.

2. Compositions showed more relations between objects, which was disposed in groups, or sections, or scenes within the whole.

3. Landscape and surroundings were more important and became the setting in which the figures and units were located, rather than merely being items alongside the figures. There was an interest in the nature of the ground, which was treated differently from other objects.

4. The picture was approaching an accurate rendering of perspective with objects diminishing in size with distance, with overlapping units, and with effects of aerial perspective.

Drawing Order. The human figure appeared to be drawn in the same order as with the schematic-level subjects: head first, followed by body and limbs, and then a return to face and other details. The style, of course, was different, and there was not the definite and unrevised statement of the schematics. Some of the lines appeared to be mere construction or guiding lines, since they were put down rapidly and covered up or re-worked later.

The schematic's serial way of drawing, by proceeding across a page drawing objects in regular one, two, three order, was followed by two subjects in this group, *Ka* (14:4) and *Sm* (8:8). In the case of *Sm* the objects were in a diagonal row, while *Ka*'s units were disposed irregularly over the page. *Sm* worked across from the left to the right, while *Ka* worked in a rough circle from the upper left across to the lower right and then to the left.

A number of drawings were constructed in a *spotting* manner, as we found was common with schematics. Eight subjects followed that procedure: *Du* (11:8), *Mo* (12:6), *Pe* (10:10), *Fi* (10:9), *Ps* (14:7), *Ma* (15:6), *Va* (16:10), and *Sa* (10:4). These compositions were of several forms. *Du*'s was disorganized; *Mo*'s dispersed; *Sa* organized units in an asymmetrical but balanced row. He worked back and forth from figures to house, tree, and grass.

A drawing unusual in style was that of *Ma*, which belonged to the double-row form, though the two rows unified by the perspective lines running through them from the lower left to the upper right and by their lack of precise position, which was not the characteristic of schematic-level drawings of this form. The drawing order was definitely spotting. An ice-skating rink in the center, a hut at the right, a telegraph-pole at the left, a figure on the ice, and a house in the center-distance were drawn in that order, lightly in outline. These units were then drawn over sketchily and re-worked to an impressionistic style from simple outline. Then two houses in the upper left were drawn and shaded, the road running across the rear, and a house at the right distance. Then there was a return to the ground around the rink and hut to shade them heavily. Then houses in the upper row in various places were added and a tree at the left and right and one behind the hut in the lower right. The drawing-order was thus a working-back and forth from the lower group to the row at the rear, putting down units and re-working them.

We find that a spotting procedure was followed in drawing two compositions of the organized-group form. *Va* (16:10) approached a trifold organization, and *Pe* (10:10) a diagonal. This latter drawing was essentially a row-form, only at an angle. *Va*'s composition was symmetrical, but the central figures were disordered. In drawing she worked back and forth from the figures to the trees which flanked them.

Two subjects drew compositions of the transition form (Form V), *Ps* (14:7) and *Fi* (10:9). With *Pe* there was a slight grouping in the background, but the trees and houses there shown were not drawn consecutively. He moved back and forth from this semi-organized group to the disorganized units in front, in the lower half. *Fi*'s drawing had a unified group across the center-front but dispersed figures behind and above. Her procedure was difficult to understand. After starting a figure on the right, she left its face and hair braids to draw a complete snowman and shade it in. Then she finished the right figure and drew part of the sled beside it, but before completing it, turned to a figure on a sled in the upper-right corner and drew it completely. After completing the sled beside the first figure, she drew the face of the figure at the left, turning from it to draw ground-lines in the upper-right and a tree, and then finished the left-side figure. After this irregular procedure, other figures and landscape were drawn, unit by unit with some re-working.

A combination of *serial progression* and *spotting* was used in the two other compositions of this group (Form V), *Bk* (16:6) and *Ko* (14:9) (see Figure 7). The figures in the front of *Ko*'s drawing were drawn in in a serial order; those at the rear were put down by spotting. In *Ba*'s composition the buildings at the rear were drawn across in order and the distributed units were spotted in in front.

This manner of drawing was apparently followed by *En* (14:4). His composition was of the key-figure type with figures arranged roughly in a circular group, backed by buildings and trees. The units were drawn in in a serial order but not following the circle of their serial disposition. *En* started at the left rear, moved to the front figure, and then, from the left around in the rear, drew the background leading up to the three figures at the right and one in the center rear. He then jumped to an object in the right-rear landscape and returned to draw a figure at the lower left, completing the circular formation. The delay in drawing this last figure is interesting, since it appears that the figure drawn first is waving a hand at it, and we found formerly that figures related in any way by action were drawn consecutively.

Some compositions showed an attempt at the group organized form (Form V). This form consisted of an organized group of units and a disorganized section. Two subjects showed this form; *Br* (13:5) (see Figure 8) and *Be* (12:6). Here we found a drawing-procedure followed which we term the *semi-constructive*. The group may be partially drawn, then left to spot in the disordered units and returned to, as with *Be*; or the group and the disordered section may be drawn more or less as whole and consecutively, as with *Br*. *Be* had a group at the left front which he interrupted in drawing to spot objects in at the rear and finished the organized group last. *Br* drew the grouped figures, light, and bench in front and then proceeded to work around the upper part, drawing in the background objects and an intermediate unrelated figure.

The general method of working from section to section around a drawing, as was done in these drawings, was the procedure followed in the main by most of these subjects who attempted an organized-group form of composition. One-half of the visually-realistic group drew compositions of this form. While we found that two attempts at this form were drawn in the spotting procedure, most subjects used a constructive or semi-constructive manner of working, wherein one section comprising several units or a section of the drawing was drawn at one time.

Four subjects attempted an organized-group composition: *Ca* (10:10) who used the vertical-symmetrical form, *Co* (15:4), *Wi* (11:7), and *Fr* (11:5), who used the diagonal form of organization. They followed this *semi-constructive* order in drawing. *Ca* drew a group at the right and then went over to the left side group and returned to finish the drawing with adding some units at the right. *Wi*'s drawing showed the effect of grouping in some places, notably at the right, but the units on the left were distributed unrelatedly. He proceeded from the unrelated group to the unified group, never drawing all of one group at once and moving about across the paper. *Fr* drew in this manner also. Drawing a figure on a sled first, he worked on lines on the hill and ground and tree at the right. Then he turned to the house, bushes, trees, and a figure in the upper-left section. He returned constantly to work on the central figure and to add to and alter the ground-lines in the center and right, and finally ended by drawing a figure in the upper-right group.

Co's composition was of the diagonally-grouped form with a hill running from upper left to lower right. This was drawn in first and a figure on a sled sliding down it and a tree at its top. Then moving to the right side, a figure on a pond, bushes, and distant buildings were drawn. Working across the top of the buildings to the left, the subject returned to the left-side section and drew in it a sign, a man, and a bench, and returned to the right for another building or two. This was followed by a general re-working of lines and additional sketching-in of ground, tree, buildings, and clouds.

We have in these drawings a feeling for unified groups, but this was not successfully realized. In such cases, we usually found a spotting procedure followed in conjunction with a constructive, as was the case here of *Co*, when he returned to spot-in units at the left and a few at the right after having begun working section by section.

The tendency to work from section to section which we found fully expressed in *Te* of the mixed schematic-level group is the method of working used by the six subjects who achieved the group-organization form of composition. *Ro* (14:7) (see Figure 9), *Ca* (12:7), and *Ba* (12:11) organized their drawings in the trifold, centrally-balanced form; and *Bu* (12:9), *Ho* (15:0), and *Sy* (14:11), in the diagonal. All of them worked from section to section or group to group which we have termed the *constructive* procedure.

Ro began his drawing with the central ground-lines, distant hills, and the tops of buildings beyond, working from the central left across the top of the page to the right. Then he drew the tree at the right and its ground; then a sled in the lower center, and worked along the ground to the left to the left tree. Then he moved to the right center and drew in a standing figure there. The picture is unified, then, with a central vista of hills and buildings a boy and sled, all flanked by two trees.

Ba's composition consisted of a group of figures and bushes at the right on paths backed by a symmetrical and balanced arrangement of houses and trees. The first group which was drawn beginning at the left, was followed by the shading of these units

and the ground. Next houses and trees in the center rear were drawn and shaded. Finally clouds were drawn across the whole. The drawing order is a combination of drawing outlines and then shading, then outlining another section and shading those units.

Ca drew the major cross-drawing line, the road, and the figure on the sled at the right. Then after the tree at the left, the center distant horizon line and a row of trees along it and a bank of clouds were put in. After re-working some of these lines over more heavily, he drew the snowman on the right and stump and can on the left and after re-working some ground-lines, he drew the bench in the lower right. A fairly regular procedure was thus followed. After the major connecting lines and the road were drawn; the figure on the right and the tree on the left flanking the distant view, were put down, followed by horizon, trees, and clouds. There was some irregularity in the latter half, when, in drawing the lower right and left objects, he left them to re-work the road and ground-character lines.

The diagonal form of composition was adopted by three *Bu* (12:9), *Ho* (15:0) and *Sy* (14:11), all of whom drew in a constructive manner. *Bu* drew the major cross-page line from the upper left to the lower right of the hill and gave its general character. She then drew the bank of buildings at the upper right, followed by the figure and sled in the lower left-hand section. After a return to put in an auto in the lower right-hand section, she put in ground-character lines there and worked up through the left section, and after re-drawing the figure's face over again, ended by drawing a figure and sled in the extreme upper left corner.

Sy's composition was similarly composed with a hill-line running from the upper right to the lower left. This line was drawn first followed by the right-hand group of figures on sleds with standing. He then drew the group of objects in the left section, beginning with a lamppost and tree at the bottom and working up to the tops of buildings showing above it. A number of lines indicating darkness were drawn in behind the tree and snow falling in the center portion of the page. He then went over the drawing in the same order, re-working lines and darkening them, especially the left group, which stood out blackly around the white radiance from the street-light. After this work and adding lines indicative of evening dusk throughout, a small tree was put in the right, finishing the drawing. With the exception of this unit, the drawing was built up and re-worked, section by section.

Ho followed this same procedure. First hill-line, then buildings at the right and tree and four figures at the left were drawn. The figures were drawn almost in their full nature at once, and then the buildings, tree, and ground were touched up and re-worked. The face and back of one figure were drawn over again at the end.

Survey of Results

Before summing up our conclusions, we present the results in tabular form. In Table III we present the relations between the compositional form, the representative level, and the order of drawing.

To show some of this material more clearly, we give in summary form Table IV which omits the various drawing procedures and compositional sub-forms.

Conclusions

The drawings by children at the schematic level of representation consisted characteristically of direct statements of independent and isolated units located on the page in a dispersed manner or placed in a row or rows. There was hardly any feeling for ordering units in groups. The composition was essentially one of discrete units carefully spaced apart. There was scant representation of actual spatial relations and little interest evident in depth, or in presenting a visually realistic "picture" or an actual scene.

The schematic unit, figure or object, was given definitely and precisely in outline. It was hardly ever altered, re-touched or returned to, except in the interests of accuracy. Units were almost always given with complete outline, which was drawn first and followed by a uniform coloring of the inner areas. The human figure was generally drawn from the major features of the head down, through the trunk to the legs, with a return to complete the facial and other details.

The units being complete and autonomous and independent of other, the order of drawing consisted of "stating" these one after another. Some children worked across the page serially, while others worked in a "spotting"

TABLE III

FREQUENCY OF OCCURRENCE OF DRAWINGS OF VARIOUS REPRESENTATIVE LEVELS ACCORDING TO THEIR COMPOSITIONAL FORM AND ORDER OF DRAWING

Compositional form	*Representative level*														
	Schematic Drawing order					Mixed-Schematic Drawing order					Vis. Realistic Drawing order				
	S	SS	Ser	—C	C	S	SS	Ser	—C	C	S	SS	Ser	—C	C
I. Disorganized	1					1					1				
II. All-over dispersion	2					1					1		1		
III. Row disposition															
A. Single: organized	4		3								1		1		
B. Single: disorganized	3					1									
C. Double			2								1				1
IV. Single object: organization dispersed	1		1			1*									
V. Organized and disorganized dispersion															
A. Row organization		1									2	2			
B. Group organization														2	
VI. Group organized															
A. Vertical symmetry attempted					1						1			1	
Vertical symmetry achieved										2					3
B. Diagonal axis attempted					1						1			3	
Diagonal axis achieved															3
C. Key figure organization												1			
Total	11	1	6	0	2	4	0	0	0	2	8	3	2	6	7
Grand Total			20					6					26		

S—Spotting procedure
SS—Spotting and serial procedure
Ser—Serial procedure
—C—Semi-constructive
C—Constructive

TABLE IV

FREQUENCY OF OCCURRENCE OF DRAWINGS OF VARIOUS REPRESENTATIVE LEVELS ACCORDING TO THEIR COMPOSITIONAL FORMS

Compositional form	*Representative level*		
	Schematic	Mixed-Schematic	Vis. Realistic
I. Disorganized	2	1	1
II. All-over dispersion	2	1	2
III. Row disposition (all forms)	12	1	4
IV. Single object: organization dispersed	2	1	—
V. Organized and disorganized dispersion	—	—	6
VI. Group organized	2	2	13
Grand Total	20	6	26

technique. Here the child located units in spaces left open by the location of other items, and worked across and over the page in a random manner. Some worked in a way combining these two manners. Units appeared to be disposed in a manner more of itemizing individual statements and with consideration for the size of the page and space for the whole object or figure than one of relating items to form a visual scene or a decorative design.

With an increase in age there came a change from the intellectual realism of the schematic toward a visual realism. The inter-

est now turned toward the representation of a visually accurate natural scene. The interest in representing space led to the use of multi-planar and implicit planar modes of representation, with diminishing size and a use of general perspective principles. This was in contrast to the aspatial and single ground-line form used by the majority of the schematic level children.

The form of composition differed also in drawings of the mixed schematic and visually realistic level. The interest in representing a scene in space led to a dispersal of objects over the page and away from a simple row form. This called for some method of organization. Some drawings of this level retain a row organization or general all-over placement, others showed an attempt at organization in combining a row of units or a group with a dispersed group in the near (lower) or far (high) space.

The majority of children however attempted to achieve an organizational form of grouping units. Two types were common, a trifold vertically symmetrical organization and a diagonal axis organization. These compositions differed from the schematics in that they were formed of groups of units related to each other, or sections each with its own activity or focus point and working together to form the whole composition. These forms of composition appeared to be an outgrowth of facility at handling the complex form of spatial representation.

With the change of interest from the almost symbolic schema to the visually real object and scene there was a corresponding change in the style of drawing. It developed from the hard outline forms to loose, free, sketchily stated and less independent units. This impressionistic technique was approached gradually and transitional styles were apparent. Indecision on the part of the child resulted quite often in less decisive and precise lines. As he gained in facility he became able to handle the sketchy technique. The transitional style was characterized by indecisive line and an as yet unsuccessful groping for the sketchy style. Whereas the schematic retouched for accuracy and definition, this style often called for a re-working and gradual building up of objects. The interest in returning to an object is dissimilar in the two styles.

There appeared to be a general relationship between the order in which drawings were constructed and the drawing's compositional form. Spotting and serial direction and their combinations were found in row compositions and those in which there was an attempt at grouping. With attempted grouped organization we found a manner of proceeding which usually worked group by group but which often jumped from one to another. The successfully organized composition we found have usually been built up group by group or section by section. The individual worked through one group, completed it and then passed to another. This procedure was constructive.

The correspondence between these characteristics was not rigid. We found five characteristics which varied to some extent independently: (a) the manner of representing space, (b) the level of representation of the figure, (c) the style of the drawing, (d) the organization of the composition, and (e) the order of drawing. While in general they appeared to be related in the manner shown above and to develop at an equal pace, we found instances in which the relationship was not maintained. The representational level of the figure or space was not necessarily the key to its general character.

Further General Considerations

The material on which we have based our study consists of a series of sketches which show the progress of construction of the finished drawing. We know from these records just how the child proceeded with the work and we can lay out, almost line by line, the sequence of the process. This knowledge does not, however, necessarily throw much light on the nature and operation of the factors in the mind of the child determining the selection of objects and their arrangement *before* the drawing begins. The act of drawing follows a decision of the artist which is the result of some mental activity whether almost instantaneous or prolonged. Just what this activity involves and what the considerations were which lead up to a decision to draw this arrangement and not that one, are not necessarily known to us from a record of how the artist proceeded.

For example, we may give an artist a problem of drawing a compositional arrangement of three objects. He may consider this prob-

lem in his mind and then come to a decision. Once having reached his decision and "visualized" the arrangement, it does not particularly matter whether he makes the drawing from upper left to lower right or vice versa. The stages of the process do not necessarily inform us of the considerations in the mind of the artist leading to one arrangement over another, to consider composition only at this time. The drawing in such a case as this is merely a process whereby the mental conception is translated to paper.

We must not, then, confuse the process of making a drawing with the creative imaginings, workings and re-workings in the artist's mind. The only way in which we could study the creative process intimately would be to secure a record of the totality of a conception and its successive alterations and reformulations. This does not appear to be possible. The process of drawing, when the total conception is clearly realized before execution, is merely a construction process proceeding part by part and an activity *a posteriori* to the conception.

This situation is usually but not always the case. There may be times when the whole composition is not conceived in toto and when the artist more or less "works it out" as he draws. It seems reasonable to believe that the drawing-process, meaning by this only the series of graphic manipulations ending with the completed sketch, may stand to the conception in a number of ways. At one extreme we might have the case instanced above: completed conception and a tentative sketching-in and re-working on the paper, the artist "thinking on paper." At the other extreme we might have an immediate statement on paper and, without a clear conception of the whole, a working-out from this point.

We must then look for signs of such relations between the conception and the execution and attempt to disclose just what information can be considered as evidence of the "considerations" which are guiding the child in his forming of the conception and in his drawing of it.

As we have found the schematic level compositions were essentially statements of "who" or "what" were involved in an activity or a place, which latter was only slightly indicated. We find that the clear statement of the figure was more important in the drawing than a representation of where it actually was or in what relation it stood to others.

Proceeding unit by unit, each independent and located neatly and discretely apart, the schematic drawing process seemed to be more an inventory of units or "things". The two major considerations then relevance of objects to the given subject—here a park scene in winter—and the availability of space for location of the unit—either of the row sort or general all-over disposal.

In the schematic drawing we could often trace the logic of selection, and could more easily have done so if the children had been requested to talk as they drew. *Fr*, who commented as she drew, worked from one unit to another on the basis of what each one, or a group, suggested. Her brother drawn, suggested her father; a tree suggested a bird next and it in turn a cat watching it and so on. It seems likely that if he could have secured more information—in the form of running comments or remarks after the drawing was finished—that we would have found such a development and unfolding of conception, that is, the contents and their relations in the drawing.

It is hard to believe that children at this level had a fully-formed conception of the whole—contents and organization—before starting to draw. The very manner of working—spotting from one space to another—appear to us to indicate that the composition was conceived as the child drew it: one unit at a time. Units were chosen in conformity to the subject and they were put down as they "came up." We might tentatively say that the child selected objects relevant to the "subject" of the work and that the form and organization of the picture was thought out as he went along putting down items relevant to the theme.

With the older child's drive toward the visually realistic he became interested in presenting an actual scene or vista as it might be seen from one place. The actual relations in size, proportion and so forth had to be keyed to this aim or the sought-for verisimilitude would be lost. It seems likely therefore that the child had a "core" idea to begin with and that although variations might be introduced as the drawing develops the process of drawing consisted essentially of reproducing or rendering this. This conjecture is supported

to some extent by the analysis of the drawing order in cases where we found "essential" lines of ground put down at the first and delimiting or subsecting a group or space for groups at the very beginning. The individual then went on to work these out, a group or section at a time. This form of composition almost required this type of approach though it could possibly have been drawn by a spotting or serial manner. The feeling of unity of the group of related items led to their being drawn consecutively and the group finished as a whole.

With increasing age the child grew in power to create an organized composition in which parts, themselves composed of units, build up the whole. This required a grasp of the totality and the part which each item was to play in it. Instead of the mere stating of unrelated units there was a conception of a whole, a recognition of the interrelationships of parts, and an orderly and considered process of construction.

The device which was used here should prove useful for the study of many aspects of children's drawings. The analysis of more compositions, as well as other types of subject matter, would enable us to establish accurately the developmental changes of the types which we have discussed and to provide a basis for the detailed study of the individual's development.

AGGRESSIVE BEHAVIOR OF NURSERY SCHOOL CHILDREN AND ADULT PROCEDURES IN DEALING WITH SUCH BEHAVIOR*

MADELEINE HUNT APPEL

Purpose of the Investigation. The present study deals with aggressiveness that is manifested by young children in their relations with one another in nursery school groups. In order to deal wisely with such behavior, teachers need as much information as possible concerning the concrete manifestations of aggressiveness, motives that underlie it, functions that it serves in the life of the individual child, and the relative effectiveness of some of the techniques teachers use in guiding it. This study is designed to add to the fund of information bearing upon these points.

Method of Study. The main data of this study were obtained through the method of direct observation—the method by which behavior is recorded while it is in the process of occurring in its natural setting.

Aggression was defined as an actual attack, or a threatened attack (by way of gesture or words) upon the person of another child, interference with his activities, or hostile or provocative language directed towards another. A record was made if a child exhibited behavior which fell under this definition, even though the recipient of the aggression did not retaliate and no conflict ensued.

The investigator stood in a central position in the nursery school observing the activities of the children. When an act of aggression occurred, she at once made a record of what was taking place, noting, as far as was possible, all details of the episode that seemed to be significant. When the issue had been settled, the investigator resumed general observation of the group until her attention was caught by another aggressive episode, when she again took notes. If an episode commenced while another one was being observed, it was ignored.

Records were first made of 73 episodes of aggressive behavior, and on the basis of these preliminary records the following tentative categories were devised:

1. The nature of the aggressive act. This included physical attack on the person, interference with activity, or provocative language only.

2. The reactions of the "victim" of aggression, and the subsequent behavior of the aggressor and other children involved. This included holding ground and more vigorous physical behavior, various kinds of vocal or verbal behavior, slight evidences of distress, and no overt reaction.

3. Adult behavior. This comprised diversion and separation, arbitrary decisions, isolation, exaction of apologies, imputation of untrue motives, removal of equipment, repairing damage or comforting the victim, explanation of the situation, suggesting solutions, appeals to friendliness.

4. How the episode ended—whether the victim yielded, or whether the aggressor yielded, with or without adult intervention.

Measurement of the Reliability of the Observer. The investigator and another worker then made simultaneous but independent observations of aggressive episodes on several occasions. After each occasion, the records of the two observers were compared item by item, making use of the categories set forth above. The percentage of agreement, as computed for the purposes of this study, represents the ratio of the number of items on which both observers agreed, to the total of this number plus items on which they disagreed.

The investigator and her co-worker made simultaneous and independent records of 69 episodes of aggression. On the basis of an item by item analysis and comparison of the contents of these 69 pairs of records, it was found that the investigator and the second observer had an agreement of 91%. A careful examination was made of the items on which there was disagreement. This showed

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no systematic errors that would prejudice the data. Accordingly, from this point on, the investigator proceeded as the sole observer. In the final tabulation of the data, use was made of the records that had been obtained during the time when the two workers were observing simultaneously. Records in which there was any disagreement were, however, eliminated.

Groups Included in the Study. The data were obtained through observations in fourteen different nursery schools. Six of these schools enrolled children of high socio-economic status, whose parents paid tuition. Eight schools, all but one Federal Emergency Nursery Schools, were tuition-free and enrolled children of low socio-economic status. The children in the schools studied included both colored and white children. The latter represented children of several-generation American ancestry and of Jewish, Italian, Irish and Polish ancestry. The enrollment in the privileged schools was approximately 10 to 15 children, and in the less-privileged group, 20 to 25 children.

The average I.Q. of the children was 114 in the schools of high socio-economic status and 94 in the schools of low socio-economic status.

Records were taken when the children were engaged in various activities on the out-door play ground, or in the indoor school rooms.

Scope of the Data. The total number of aggressive episodes recorded in the study as a whole was 641. The usual episode involved two children, although sometimes more.

Two hundred thirty-two different individuals appear in the records, 52 of which figured only as "victims" of aggression. There were 180 different individual aggressors, 46 of whom were two years old, 88, three years old and 61, four years old. These individuals were involved in 650 "aggressor units", defined as one aggressor in combination with a victim or victims. In a few episodes more than one aggressor was involved. An episode having two aggressors was counted as two aggressor units. The number of aggressor units is therefore slightly larger than the number of episodes. The records include 151 aggressor units at the two-year level, 286 at the three-year level and 213 at the four-year level.

Potentialities and Limitations of the Data. It is apparent that the data were not intended to answer the question as to how often young children fight per unit of time, but rather the question as to what characterizes their behavior when they do fight, and the further question as to what methods teachers use in dealing with aggressive episodes.

In studies in which it is desired to draw conclusions with respect to frequency of aggression, the method used is to observe each child for the same length of time. For example, Jersild and Markey (5),* in their study of conflicts between preschool children, took records upon each of their subjects for ten fifteen-minute periods. In the present study, however, the investigator was not interested in *how often* children fight per unit of time, but in *how* and *for what* children fight, and what methods of adult intervention are used. It therefore was deemed appropriate to observe many children in many situations and under many different teachers. Although not all of the instances of aggression could be recorded, since more than one sometimes occurred at a given time and since some may have escaped notice, the observer recorded one episode after another, without any selective bias. She endeavored to record in detail as many conflicts as possible, without regard for the age or sex of the participants, or the issue that precipitated the episode.

In order to determine whether this method of observation resulted in a fair sampling, the aggressive episodes recorded in the present investigation were classified according to the two categories used by Jersild and Markey in the study cited above. Each child in their study was observed 150 minutes. The two categories used for classification were: apparently unprovoked attacks upon the person, or threats of such attacks; and actual or threatened interference with the materials, space, or activities of another. Jersild and Markey found that 67.4% of the initial acts of aggression were in the latter category. In the present study the corresponding percentage for schools of high socio-economic status was 72% (not significantly different from Jersild and Markey's percentage), and for schools of low socio-economic status, it was 68%. The close correspondence of these figures with those of a carefully sampled study seems to indicate that the data of the present study are representative.

* Other studies, dealing with the quarrels of young children, that were consulted in the prosecution of this investigation are listed in the bibliography at the end.

Characteristics of Children's Aggressiveness

From an examination of the original records categories were devised for the classification of the aggressive acts. The data were then classified by two independent workers. One hundred fourteen records, which had not previously been examined in consultation, were used for this purpose. Agreement as to which children were the aggressors and victims of aggression was 96%, and making use of the 110 cases on which there was agreement as to the aggression, the agreement as to category was 81%. The next step was an examination of the disagreements and a refining of rules. Then, after the lapse of a considerable period of time, the process of independent classification was repeated. On this occasion the agreement was 94% in identifying the aggressor and victim, and 77% in determining categories. Again after reconsideration and revision, a final trial was made, this time on a different set of 100 records, which had not been under consideration for a long period. The result was 86% agreement in determining the aggressor and the victim and the same for classification into categories. It was therefore concluded that the categories had been finally distinguished from one another with sufficient clarity.

A description of the categories follows:

1. Desire for possession of property. This category includes acts of aggression directed towards gaining possession of materials, toys, or equipment.

   Example: Charles says to Herbert: "I want that chocolate soldier," reaching for a wooden toy Herbert is holding.

2. Cross-purposes. Behavior which resulted in conflict over ways of using toys or equipment, or methods of pursuing imaginative play, is included under this heading.

   Example: Children are playing house. Louise announces she is going to feed Binkie (with a block she is imagining is food). Binkie insists it is not food, but a block, refuses to be fed.

3. Teasing. In this category are included name calling, disagreeable remarks—in fact all provocative language. Also included are physical acts apparently aimed primarily at producing annoyance, rather than to achieve a purpose, such as the use or possession of another's toy.

   Examples:

   "I took your shovel away, Hilda."

   "You're a naughty, naughty boy, George."

   Jimmy repeatedly pinches and hits Freddie and pulls his hair. Freddie begins to cry and Jimmy says with a smile of apparent pleasure:

   "*Now* he's crying, *now* he's crying."

4. Intrusion, and rejection of companionship. This category includes difficulties which arose over a child's unwelcomed efforts to join in the play of another, or a child's attempts to get rid of an unwanted companion.

   Example: Three children are playing in a packing box. Buddie barges in, but is at once pushed out.

5. Desire to be first, or to be important. Trying to get first turn, blocking the sliding board, or insisting upon being the one to do something, come under this heading.

   Example: Mid-morning lunch has been announced. Peter pushing several children aside says, "*I* want to pass the crackers. *I*'ll pass them."

6. Accidental. In this category are classified acts which were due to chance interference with another.

   Example: A child who is riding a bicycle and whose attention has been diverted bumps into another child.

7. Other. A few miscellaneous episodes were combined in this category. They include: desire to occupy a certain space, imitation of the action of another, reaction to an upsetting experience which has taken place just previously, defense of a friend.

8. Undetermined. This category includes apparently unprovoked attacks and interference. Since the aggressor, in these instances, gave no definite indication of his motive, they could not be classified in any of the above categories.

Frequency of Aggression in Various Categories. It was found that 36% of the total number of the aggressive episodes fell under the heading of *desire for the possession of property*. An analysis by means of the chi-

square technique* proved that the difference between this and other categories was statistically significant.

This interest in things per se appears to decrease with age, as is evidenced by the finding that, among the four-year-olds, only 27% of the aggressor units fell in the category *desire for possession of property*, whereas among the two-year-olds, 42% came under this heading.

Next to possessions in frequency of occurrence, among all the children, were the aggressive episodes which consisted of apparently *unprovoked attacks* upon the person of another, or out-of-the-blue interferences with another's activity. Fifteen per cent of the total number of episodes came under this heading. A variety of reasons may account for this behavior. It may be one way of experimenting with the environment, of making social contacts, or of gaining social prestige; it may provide an outlet for muscular energy, or it may be an expression of hostile feelings which have resulted from frustration. Eleven to twelve per cent of the episodes (a not significantly smaller proportion than *unprovoked attacks*) fell in each of the categories: *intrusion or rejection of companionship*, *teasing*, and *cross-purposes*.

Children fought more because of *cross-purposes* in the schools of high socio-economic status than in those of low status, 16 as compared with 6% of the episodes in the respective groups falling in this category. On the other hand in the less-privileged schools a larger proportion of the episodes are found in the category *desire for possession of property*, 44% as contrasted with 30% in the privileged schools. These differences in the factors precipitating aggression may be due to a greater competition for toys and materials in the less-privileged group, because of two factors: a relative poverty of toys and materials in the homes of the children, and a smaller quantity of play equipment in relation to the size of the enrollment in the less-privileged schools, than was the case in the privileged schools.

Furthermore it was thought that the higher proportion of aggressive episodes due to *cross-purposes* in the privileged group might be due to the higher level of intelligence of these children. The children in this group appeared to engage in more elaborate play schemes, which might lead to more differences of opinion as to methods of play. A bit of evidence supporting this hypothesis was furnished by the discovery that, in the privileged schools, the bright two year olds were more likely to become involved in episodes precipitated by *cross-purposes* than the duller ones. Twenty-eight per cent of the aggressor units in which the aggressors had an I.Q. of 110 or over came under the *cross-purposes* category and only 8% when the aggressors had I.Q.s of less than 110. The median I.Q. of the high group was 124 and the "low" group 106. This difference did not appear at the two-year-level in the less-privileged schools. Since the median I.Q. of the group of more intelligent twos in the less-privileged schools was only 104 as compared with 124 in the privileged schools, it would seem to indicate, although not conclusively, that the tendency to become involved in difficulties because of cross-purposes appears mainly in the case of two-year-old children who are substantially above the average in intelligence. The tendency we have been discussing did not appear at the three and four-year-levels. This suggests that by reason of his superior mental endowment, the precocious child of two is more capable of entertaining purposes which may conflict with those of others than he is socially capable of realizing them without friction.

Number of Successive Stages and Extent of Emotional Manifestations Associated with Aggressive Behavior at the Age of Two and Four. It was thought well to investigate not only the relation of age to the frequency of aggression in the various categories but also to study whether there was a relation between age and the kind of behavior exhibited when children were aggressors, and when they were victims of aggression. The first question asked was: Do the older nursery school children show more persistence in their encounters than the younger ones, when they play the role of aggressor? It seemed feasible to obtain information on this question by classifying aggressive acts according to the number of stages or "rounds" in each episode. A one-stage episode was defined as an aggressive act and the physical or verbal response to it on the part of the second child, followed by the resolution of the difficulty. The episode was considered to have more than one stage if further action on the part of one of the participants intervened between the first

* The chi-square, χ^2, procedure, applied to the frequencies, was used consistently throughout this study to test the significance of results wherever quantitative comparisons are made.

stage and the behavior which ended the difficulty.

In order to test the adequacy of the definition of stages, two workers applied it independently to forty records and obtained a satisfactory agreement—90%.

The episodes in which both aggressor and victim were four years old and those in which both participants were two years old were then examined to determine the number of stages in each. It was found that 67% of the aggressions of the fours-versus-fours went beyond one stage, as against 40% of the two-versus-two aggressors (a significant difference, according to χ^2). It appears that the aggressive behavior of two-year-olds is less persistent, more fleeting.

The next point studied was whether or not overt manifestations of emotion were present more or less frequently in the episodes of the two-year-old aggressors, in comparison with those of the four-years-olds. A mention in the record of crying, whimpering, shrieking, or appeals to adults, verbal protests, words repeated with emphasis or in a threatening manner was taken as evidence that some emotion had been overtly manifested.

Again, the data were classified independently by two people, and an agreement of 95% was obtained as to whether or not there was evidence of emotion in the 40 records used for this purpose.

The data showed that a smaller proportion of the two-versus-two aggressions (37%) than the four-versus-four aggressions (55%) were accompanied by emotional manifestations.* It would seem that not only do four-year-olds tend to carry their aggressive behavior into more stages than do the twos, but they precipitate situations in which there is more frequently some display of emotion.

Relative Effectiveness of the Behavior of Children of Two and Four, when Victims of Aggression. We have seen that four-year-old children, when they are aggressors, appear to have more persistent purposes than the twos, and tend to pursue them with more emotional drive. How effective are they as victims of aggression in comparison with the younger children?

To determine this, victim behavior was classified as *directed, undirected* or *no overt reaction. Directed behavior* included holding on to something the aggressor was trying to take away, or making positive moves to recover it, if the aggressor had been successful; it included retaliative behavior against the aggressor and all action which seemed to be aimed at reconstituting the situation which the aggressor had disrupted. When the record made no mention of the kinds of behavior listed above, but indicated only such reactions as crying, squealing, complaining, vocal protests, looking distressed, withdrawing, or automatic self-defensive movements, it was classified as *undirected behavior.* The classification, *no overt reaction,* is self-explanatory.

The data were also classified in terms of the effectiveness of the victim's behavior. The behavior was considered *effective,* if it achieved what the victim apparently desired, and *ineffective,* if the aggressor won. In cases in which teachers interfered, the behavior of the victim was considered only up to the point of intervention. It was determined whether the chances for victory were as good for the victim as for the aggressor. If this was the case, the behavior was classified as *effective.*

The objectivity of the definitions in regard to the effectiveness of victim behavior was tested by two independent workers, first using a group of 75 records and then a fresh set of 100 records. The percentages of agreement on the two trials were 83% and 88%, respectively. The criteria to determine whether or not the behavior was *directed* were similarly tested upon 25 records, with an agreement of 76%. Revisions were made in the rules, and a second test, utilizing a fresh set of 25 records, yielded an agreement of 92%.

The results showed that a significantly larger proportion of *directed behavior* is exhibited by the four-year-olds than by the two-year-olds, 81% for the former as compared with 54% for the latter. The relationship is reversed in the *undirected* category; only 7% of the four-year-olds' behavior is *undirected* as compared with 22% of the two-year-olds'. Moreover, there is a larger percentage of the twos' behavior which comes under *no overt reaction* than is the case with the fours'; the per cents are 24% in the former case and 12% in the latter (a statistically significant difference in frequency).

Moreover two-year-olds' *directed behavior* was effective in prevailing over the aggressor 57% of the time, whereas in the case of the four-year-olds it was effective 67% of the

* There are, however, between 5 and 10 chances in 100 of this difference being due to chance.

time.* Two-year-olds appear to be somewhat less likely than their older playmates to focus their behavior upon a realistic handling of a situation.

Aggressive Behavior as Related to Individual Differences in Personality Pattern and Motivation. The quantitative data on the overt behavior of young children during aggressive episodes was supplemented, in the present investigation, by studies of six individual children, well known to the investigator from daily contact in a nursery school throughout a full school year. A brief description of these children is introduced here as a reminder that, underlying overt aggressiveness, there often are factors which greatly affect the quality of the individual's behavior. The characteristics of a given child's aggression will depend not only upon his age and intelligence and to some extent upon his socio-economic status, as the foregoing discussion has shown, but also upon his individual life experiences.

The character of a child's aggressive behavior in the nursery school may apparently be affected by a lack of discipline on the part of parents. Mildred's case is illustrative. At home she was accustomed to getting almost everything she wanted; her parents had little control of her. The mother complained that she had no idea how to manage her, and this was evident when she came to take Mildred home from school. The latter found it simple to wind her mother around her finger and delay leave-taking indefinitely. Mildred, apparently, was a sincerely loved but spoiled child, who was used to getting around or overriding others, if they stood in her way. At nursery school she often took what she pleased imperiously from the other children, using her fists energetically in the process. When a child interfered with her, even if by accident or in an effort to join her play, she would respond like a little spitfire. The frequency of her encounters and the vigor of her physical combativeness in her conflicts with other children, appeared to have been influenced at least to some extent by her lack of discipline.

Too much discipline at home may have an opposite effect upon a child's behavior in school. Paul had apparently been trained to be a perfect little gentleman in his dealings with others and was accustomed to the services of a household of adults. When he first came to the nursery school, he lacked initiative and was too obedient; nothing was undertaken without first asking permission. The boy was so lacking in self-confidence, that he constantly asked others to help him. He was worried if his hands became soiled. He was almost totally lacking in spontaneity and aggressiveness, a serious little person, with no joy or lightsomeness about him. His only resource when his rights were violated, or he was knocked about by others, was to appeal for help to an adult. Paul was not aggressive enough.

Sibling jealousies were another factor influencing nursery school aggressiveness. Sarah was extremely jealous of a young sister whom her nurse favored. At school, she took great pleasure in slyly pinching or otherwise hurting the youngest children in the group, but never bothered the older children. It looked as if she was taking this way of getting even with the more-favored little sister. At all events, upon the advent of a new nurse, who took an affectionate interest in Sarah, the hostile behavior diminished and practically disappeared. The transfer of home jealousies to the school situation is not uncommon; it is rather frequently reported by nursery school teachers.

Parental imposition of overly-high standards of moral conduct may also affect the quality of a child's aggression in the nursery school. This was true in the case of Edmund, who was afraid to express the aggressiveness he felt.

His parents were very idealistic and Edmund was apparently afraid of falling short of their precepts. He would drop everything to enter a quarrel on the side of the victim, for this gave him a chance to be aggressive in a morally-approved way. His direct aggression usually consisted in excluding others from his play, but he did not dare to do this unless he had an ally, and even with this backing, he would cast quick, guilty glances at any adult who was nearby. The mildest comments of teachers were interpreted as disapproval. He seemed to have much too severe a conscience. The energy which might have been directed towards his interests and achievements had been diverted to "being good"—too good, for his fear of disapproval was inhibiting his freedom.

* There are between 5 and 10 chances in 100 of this difference between twos and fours being fortuitous.

Home tensions and lack of stability may bear fruit in an attitude of hostile aggressiveness towards other children in the nursery school. This is apparently what had happened in the case of Mary, a sensitive girl with much charm of personality.

She was an only child in a household of adults. The father was interested in his daughter, but without any sympathetic understanding of her temperament. A sense of humor seemed entirely lacking. His method of dealing with the girl was "reasoning", which gave way under sufficient provocation to shouting and occasionally to rather severe spankings. Although the mother was very fond of Mary and had a more sympathetic touch with her than the father, she was temperamentally high-strung and confessed that she was often inconsistent and tense in her dealings with her daughter.

At school Mary was tense and disorganized, always reacting to any confusion in the group, and speaking in a high-pitched voice. With rare interludes, her relations with the other children were very aggressive. Seemingly without provocation, she would bump into them with a truck, knock down apparatus, or destroy their block buildings. Upon entering the play-yard in the morning, she might begin throwing things at the children. There was a good deal of threatening talk of an excited sort and name-calling,—"Climb down and hit yourselves!" "You're a dumb baby!"

But with all this bravado, Mary's aggressiveness lacked conviction, and one felt it came from weakness rather than strength. Although she retaliated fiercely if another attacked her, she readily became tearful if the battle seemed to be going against her. Her attempted defiance of adults was indirect and subtle. She seemed to lack the courage for open rebellion.

Even before entering nursery school children have passed through an important period of their lives which has left a mark upon their behavior. As we have seen by the foregoing accounts of a few individual children, attitudes and emotional relationships within the family, influence the freedom with which children enter into their play life and affect their relations with their playmates. To understand aggressive behavior, it is necessary to consider the motives which may lie behind it.

Adult Procedures of Dealing With Aggressive Behavior

The role of the adult in the aggressive episodes of young children has not been described or evaluated quantitatively in previous studies. Since adult procedure especially concerns nursery school teachers, the present investigation has included an analysis of the frequency of adult intervention, a description of the various forms of intervention, and findings concerning the effectiveness of different adult techniques.

Frequency of Adult Intervention. The amount of intervention varied in the different schools from 22 to 58% of the episodes, the percentage being 43% for schools of high socio-economic status when grouped together and 36% for schools of low socio-economic status. The chief factor influencing the amount of intervention seemed to be the victim's effectiveness in meeting aggression. There was intervention in 51% of the episodes in which the victims of aggression appeared ineffective, as against 37% of the episodes in which they appeared effective. Teachers more often interfered to help the weaker child.

Techniques of Adult Intervention. After a tentative set of categories for the analysis of adult techniques had been determined upon, two workers independently analyzed 102 records, which included 163 adult techniques. There was agreement on 66% of the techniques. After a further definition of categories and revision of rules, a second comparison, utilizing a different set of records yielded a 61% agreement. After a further refinement, a third comparison, involving a new coworker, resulted in 76% agreement.

Some of the techniques were designated as *teaching* techniques, others as *ending* techniques. Under the first of these headings were included methods of intervention apparently intended to encourage attitudes and to teach procedures which might help children on future occasions. The teacher's apparent aim in the use of *ending* techniques was to restore peace as rapidly as possible.

There remained various techniques not classifiable as either of the *teaching* or *ending* variety. These included *seeking information, merely approaching, deliberately ignoring, repairing damage* and *comforting a child who was upset or hurt*. A description of the categories which were finally adopted is given on following page.

A. Ending techniques

1. Diverting. Whenever an adult diverted a child to new activity, the behavior was included here. *Example:* Two children dispute possession of a swing; teacher diverts one to climbing.

2. Separating or removing. This includes separating children or removing controversial equipment, without redirecting interest into new channels. *Example:* Child throws a small chair at another. The teacher separates them.

3. Restraining. When an adult intercepted a kick or a blow or prevented other forms of incipient physical aggression, the behavior was included here. *Example:* Boy raises a stick above a girl's head. The teacher quickly takes hold of it and prevents the blow.

4. Arbitrary decision. Adult orders were entered under this heading. *Example:* In dispute over sand shovel, teacher tells one boy to let another finish his cake.

5. Enforcing a rule. Statements about rules, or about what is or is not done were classified here. *Example:* When one boy pushes another as they stand on top of a packing box, teacher says "No pushing when you're up high!"

B. Teaching techniques

1. Explaining property rights. Adult explanations about the rights of "ownership" were entered here. *Example:* In quarrel over piece of rubber hose teacher says: "Eddie had it first. When he finishes, you can have it."

2. Urging self-defense. Encouragement of more effective defense came under this heading. *Example:* Child who has had rake taken away whimpers and complains. Teacher says: "Go and get it, Rena. Go and get it from John. You can."

3. Suggesting a solution. When the adult made a definite suggestion as to ways of resolving a difficulty in order to enable children to play together, the behavior was classified here. *Example:* There is a dispute over which child shall have certain location for a bed in playing house. Teacher says: "Susan, you can have your bed over here."

4. Suggesting children find solution. This technique says, in effect, "I think you can find a way out yourselves." *Example:* In struggle over a pail, teacher says, "Couldn't you talk about it?"

5. Interpreting. When an adult explains to one of the children the feelings, desires or plans of another, her explanation comes under this heading. *Example:* During music, when Bea tries to take Ann's hands to play see-saw, Ann pulls away. Teacher says, "I think Ann wants to do it alone, Bea."

6. Encouraging friendly acts. If an adult suggests that a child share or encourages some other friendly act, her behavior is included under this heading. *Example:* Boy tries to get a piece of a puzzle from girl's hand. Teacher asks her which piece she will give him.

7. Making light of troubles or hurts. All remarks which encouraged a child to pay less attention to troubles or hurts were classified here. *Example:* Girl cries when another bumps into her. Teacher says: "It didn't really hurt much and it's all over now."

8. Requiring good manners. Requests to say please or to comply with conventional forms were included here.

9. Disapproval. Under this heading are included exclamations of disapproval and all remarks of a moralizing kind. For example: "I want you to be a *good* boy today."

10. Retaliation. If an adult retaliates or encourages retaliation to punish the aggressor, the technique is included here. Girl hits boy and tries to take ball from him. Teacher says: "Hit *her*, James." When he does, teacher says: "Now you know how it feels, Edna."

Tabulation according to these categories showed that in the privileged schools a larger proportion of *teaching* than *ending* techniques were used, while in the less-privileged group, *ending* techniques were used more often than *teaching* techniques, except in one school. When *teaching* techniques *were* used in less-privileged schools they usually consisted in explaining property rights in connection with quarrels over toys and materials, whereas in the privileged group more use was made of such methods as *interpreting, suggesting methods of adjustment,* or *encouraging children to find their own solutions to conflicts.*

Evaluation of Adult Techniques as to Effectiveness and "Goodness". An analysis of the relative effectiveness and value of the different adult techniques should prove helpful to nursery school teachers. Accordingly the various adult techniques were examined to ap-

praise their effectiveness in resolving aggressive episodes.

A tally was made either under *effective* or *ineffective* for each occasion on which a technique was used. If the conflict continued after an adult had employed a given technique, it was considered *ineffective;* if the technique brought the episode to a conclusion, it was entered as *effective*. This designation is perhaps somewhat arbitrary, but appears to be useful in the present instance.

A classification of 50 techniques by two independent workers yielded an agreement of 88%. After an examination of the disagreements the rules were clarified and all of the adult techniques appearing in the records were classified.

The "goodness" of the adult techniques was also evaluated. Each technique was tallied under the heading of *good,* or *incomplete,* or *poor*. Techniques were appraised as *good* if they seemed to meet adequately the needs of the particular situation and if there was no definite reason for designating them as *poor*.

A technique was considered poor, if

1. The adult appeared to misunderstand the situation.
2. The adult's attitude seemed undesirable: lacking in sureness, not straight-forward, unsympathetic.
3. The technique involved directions or explanations that were not clear.
4. The technique was unrealistic or impractical.
5. Undesirable attitudes were encouraged.
6. The children's purposes seemed to be blocked unnecessarily.

A given technique was entered as *incomplete* if it seemed to be good as far as it went, but lacked certain desirable features. For example, in quarrels over property, if the adult explained who had legitimate right to the disputed toy or material, but omitted a suggestion as to where the loser could find a substitute, the technique was considered *incomplete*. Also appraised as *incomplete* were decisions which were made or rules enforced or warnings given, when explanations were lacking. Suggestions for the solution of difficulties which were not sufficiently specific were also included under *incomplete*.

When these rules with regard to "goodness" were applied independently by two workers to 50 adult techniques, the percentage of agreement which resulted was 86. All of the remaining data were then classified.

Among the *ending* techniques *diverting* and *separating* were both very successful (93 and 85% effective, respectively). *Diverting* appears to be more desirable, since it provides for the redirection of children's energy and interest into new activity. This seems to reduce frustration and therefore may prevent further aggression. This probably accounts for the fact that *diverting* was rated as good 95% of the time and *separating* somewhat less frequently, 74% of the occasions on which it was used. *Separating* was rated as poor if diverting could just as well have been substituted, in the judgment of the investigator. When children are emotionally upset, they may not be open to suggestions for an alternative activity, and in these cases separating is "good", the only practical procedure.

Arbitrary decisions on the part of adults were effective 65% of the occasions when used, but were considered good only in 57% of the instances. While authoritative procedures are sometimes called for and accepted with relief by the children, it is well to avoid them as much as possible. They may produce feelings of frustration and may therefore increase aggressiveness. This result may be obviated if the reason for the authoritative technique is given and some mitigation is offered for the frustration involved.

While the ending of conflicts is one of the purposes of teacher intervention, there is a more important educational aim. This aim is to teach children acceptable methods of social intercourse by encouraging them to maintain their own rights and respect those of others, by increasing their understanding of each other's desires and purposes, and by giving them specific techniques of social adjustment. The *teaching* techniques are designed to accomplish some of these purposes. They should be judged not only by their success in resolving conflicts, but by the opportunities they afford the children to learn serviceable methods of social adjustment.

Interpreting the wishes and feelings of one child to another ranked significantly high on both counts, having been found effective 71% and good 89% of the time. Increased understanding of another's point of view apparently increases willingness to take it into consideration and to make necessary adjustments to that end. Since failure in understanding is

one of the causes of hostility between human beings, teachers can make a contribution by fostering from the early years the habit of seeking out and trying to understand the purposes and feelings of others. In one episode a boy named Bill grabbed an ear of corn from Herb. Herb calls him a bad boy. The teacher explains that Bill wanted the corn so badly he could not wait to ask. Herb accepts the suggestion that he share his supply of corn and the two boys begin playing together.

Explaining property rights is another technique which encourages consideration for others. It is a little more authoritative than *interpreting* and may have the drawbacks which that entails. These will be minimized, however, if the explanation of why the toy or piece of equipment belongs to a particular child is made clear, and if, furthermore, the child whose claim is denied is comforted by the suggestion of an alternative or by a promise of a turn later. *Explaining property rights* met the standard for "goodness" only 42% of the time, but the technique was effective in settling quarrels over possessions 69% of the time.

Almost equally effective (66%) and rated good 83% of the time was the technique which consisted in *suggesting a solution* of a difficulty so that children could go on playing together. The more definite the suggestion, the more likely it was to be accepted. It might be a very simple suggestion, like getting another broom so both children could sweep, or it might be a suggestion to facilitate the progress of more elaborate cooperative play. In the latter case it was successful when the adult was clever in making her suggestion fit in with the purposes of the children. A good illustration is afforded by the episode in which Dusty forces his way into a house in which Ham and Allen are playing. They repeatedly push him out but finally accept him when the teacher suggests that he can go to market for them.

When the adult fails to understand what is involved in a given aggressive episode, her intervention may lead to injustice or to confusing misinterpretations. A teacher, in one instance, told a child that the aggressor did not mean to push him off a plank, when it was quite obvious to an observer that he *had* meant to. When a teacher is not en rapport with a situation, it is usually better to keep "hands off", whenever possible.

There were some instances of adult techniques which seemed undesirable because of the attitude of the teacher. She may have been lacking in self-confidence and uncertain as to what to do; her approach may have been insincere, lacking in straight-forwardness; or she may have betrayed irritation or lack of sympathy with the children she was trying to help. The following record will illustrate how lack of sureness in the adult's approach confuses the situation and hampers children's opportunities of profiting by their experience:

Michael tries to grab sand shovel from Filomena.
Student Assistant: "Wait a minute. Wait a minute. Who had it first?"
Filomena: "I did."
Michael: "But I want it."
Student Assistant: "You can find something else."
Michael continues to try and get it, struggling with Filomena, who holds her ground.
Assistant Teacher: "Couldn't you talk about it, Filomena?"
Filomena: "I had it, Michael."
Michael: "But I want it."
Assistant Teacher asks who had it.
Michael: "She did, but I want it."
Assistant Teacher: "Well, you can use it later."
Filomena gets away during this talk, to other side of sand-box.
Sylvia comes up and says, "I'll get one for you, Michael."
She goes over to Filomena and tries to grab the things away from her, saying she is going to get them for Michael.
Assistant Teacher says, "Sylvia, Michael can look out for himself."
Sylvia continues to grab and hit Filomena, who hangs on, but does not retaliate.
Assistant Teacher: "Michael will get it if he wants it."
Michael: "I can't."
Assistant Teacher: "Filomena will give you a turn when she is through, won't you, Filomena?"
Filomena: "Yes."
This settles the matter.

One has the impression that a constructive procedure would have been to provide Michael with another shovel at the beginning of this episode, or to have said immediately

what was said at the end: "Filomena will give you a turn when she is through, won't you, Filomena?"

It is undesirable when adults show their lack of self-confidence by failing to see that orders are carried out.

It is also undesirable when what the teacher says does not "ring true". For instance, "I'm sure he'll let go when he understands," is little more than a pale and pious hope when all the evidence points to the contrary.

Furthermore when the adult's attitude was unsympathetic or showed irritation little was was accomplished. The technique of *disapproval* frequently expressed irritation and probably because of this was effective only 40% of the time. Disapproval and moralizing immediately puts a child on the defensive and he will be likely to react either with resistance or by "wilting", according to his temperament. In both cases the child becomes occupied with his emotional relationship with the adult and is not free to consider what behavior would be constructive in the situation in which he is involved. Moreover, according to the findings of this study, the technique of *disaapproval* usually gave children little opportunity to learn, since it was rarely accompanied by any explanation of the reason for the disapproval. Exclamations, such as "Edward! Edward!" or remarks such as "Peter don't do that! I want you to be a good boy today," provided no helpful clarification of the issues.

Two conditions which make adult methods of dealing with children's aggression unsatisfactory have already been discussed, namely, misunderstanding of the situation and lack of a desirable attitude on the part of the adult. A third important consideration is clarity. To make learning possible the teacher must make very clear what she is trying to say. In one episode in which there was a dispute about who should put away a basket, one of the children hit the other over the head with it and the teacher's intervention consisted in asking what baskets are for. This focused attention upon the use of baskets, but made nothing clear with regard to the children's relationship to each other. The teacher could have said, "Look out for our basket! Mabel is putting it away. Sally, you could put those beads on the shelf."

A fourth condition which designates an adult technique as unsatisfactory is a lack of realism or practicality. Sometimes teachers make statements which are not in accord with the facts. For example when one boy hit a girl the teacher said, "James! we don't hit." In reality children often *have* to hit to maintain their rights and to be respected in their group. One little boy known to the writer had been told never to hit a girl. When he was repeatedly molested by a girl in his nursery school he gave every appearance of feeling completely frustrated. All he could do was to jump up and down in a rage and appeal to the teachers for help. Without this prohibition he could have handled the situation in a self-respecting way. Adults in their relations with each other are more able to resolve their conflicts by other than physical means. In response to insult they may adjust the situation on the verbal plane or even maintain a dignified silence. But children of nursery school age are not sufficiently mature to rely completely upon verbal adjustments. To gain their ends, physical force is often necessary. The pronouncement "we don't hit", by the nursery school teacher quoted above, was therefore unrealistic.

As the foregoing discussion indicates, urging children to "talk about it" would seem to be impractical at the nursery school age level. This technique was effective only 33% of the times it was used. Children of this age are usually incapable of proposing compromises such as an adult might suggest. The only "talking" they are likely to do in such a situation is to state their desires and usually these are already known. "Talk" did not impress the adversary or yield the desired results.

Techniques of intervention are obviously to be rejected if they encourage undesirable attitudes on the part of the children. There was one case in which a teacher told a child who was hit to strike back, not in order to help the victim in his own defense, but to teach the aggressor a lesson. It appeared to be a retaliative measure and it seemed to encourage an ugly spirit.

The best adult methods avoided unnecessary blocking of children's purposes and energies. Telling children what they cannot do or cannot have is not desirable unless a brief explanation goes along with the telling and unless outlets are suggested in other directions. Children of nursery school age are only beginning to learn to tolerate frustration and their toleration point is still very low. They

have to meet frustration frequently enough. It is a safe procedure in the nursery school to reduce it as far as possible, so that unnecessary aggression need not be fostered.

General Discussion of the Guidance of Aggressive Behavior in the Nursery School. Certain general principles of guiding the aggressive behavior of young children emerge from this investigation. It is evident that the wisdom of the techniques used by teachers must be considered both in relation to the educational goals which teachers have in mind and in relation to the needs of individual children.

The foundation stone for a philosophy of guidance in the nursery school is the relationship between the teacher and the child. The teacher's attitude must be neither sentimental nor coldly detached, but rather one of sincerity and warmth. The modern nursery school teacher not only recognizes the child's potentialities for friendliness, but also his selfishness in the pursuit of what he wants and his aggressive feelings when he is balked. She accepts him for what he is and offers her loyal support. Without this support even "good" techniques for dealing with aggression will not have much chance of being effective and helpful.

The teacher will recognize that most nursery school aggression is either the by-product of a healthy urge to activity and to the pursuit of interests and purposes, or a self-respecting defense of these interests when under attack. In helping children to modify the objectionable features of their aggressive behavior, teachers do not want to repress this forward-moving impulse. It is necessary, in order to get ahead in the world and to overcome difficulties. One of the teacher's important goals, therefore, is to encourage the development of courageous, creative individuals, eager for activity and accomplishment, and to release the energies of children whose play life is blocked. For example, Paul, the over-nice little boy whose case was mentioned above, had to be encouraged to get his hands dirty, if necessary, to be more self-reliant and aggressive in forwarding his own interests.

Another important goal of the nursery school is to teach children how to get along with one another. This necessitates taking the purposes of others into consideration, and adjusting and limiting one's own purposes accordingly. When a child first enters nursery school he may be only vaguely aware that other children have feelings and wishes and plans like his own. The other children themselves soon begin to change this situation, however. If they are interfered with, they will usually protest with counter-aggressiveness. In this situation the nursery school teacher does well, as a general rule, to keep hands off. Limitations by other children imposed in this way seem to be assimilated, for the most part, without more than a passing sense of frustration, since the frustrating agent in this case is only another child, and not a beloved parent or parent surrogate whose rebuff may be interpreted as rejection, or lack of devotion. Children learn a great deal from each other about the realties of social intercourse through first-hand experience. Teachers are perhaps too ready to intervene in aggressive episodes. Too much intervention may prevent children from becoming self-reliant.

On the other hand, there are many occasions when nursery school children need help in their quarrels. If a child retreats from the scene, or fails to defend himself by word or deed, the aggressor has learned nothing of the necessity for consideration, and the victim has failed to achieve a sense of self-adequacy. If a child is being constantly interfered with and is consistently inadequate and ineffective, intervention seems necessary. Such a child can be encouraged to defend himself; the teacher can say, for example, "If he keeps bothering you, you can push him out of the way."

There are other circumstances which also call for intervention. If one child is endangering another physically, or if the atmosphere is tense with emotion, the adult should intervene and use her authority to resolve the situation with dispatch. The so-called *ending* techniques described earlier in this chapter are useful in this connection. There are some things which one child simply cannot be allowed to do to another, and in these circumstances the adult must insist upon behavior which takes others into account. An undisculties, since as we have seen, it brings about frequently needs to have the adult "lay down the law" in a direct, unemotional way.

Mere insistence upon considerate behavior, however, does not go very far. How can a *willingness* to consider others be cultivated? It will probably grow gradually as children learn that considerate behavior brings as a reward the fun of companionship in play,

the friendliness of the other children, and the approval of adults whom they like. This desire to co-operate may be encouraged if children are given an increased understanding of each other, if the teacher interprets one child's purposes and feelings to another. The understanding which such interpretations b r i n g seems often to be a practical solvent of difficulties, since as we have seen, it brings about solutions of difficulties about 71% of the times it is used.

Adults must also help children with specific techniques of adjustment. If, in disputes over property, they suggest alternatives, the children may gradually learn to seek substitutes for themselves. If, in difficulties due to cross-purposes, the teacher finds out what each child wants and suggests how their plans can be woven together, the children should eventually learn to seek out such solutions for themselves. If definite acts of friendliness are suggested and rewarded with approval, children will perform such acts more frequently upon their own initiative. Learning may be slow; many repetitions will be needed. But at all events, these techniques give children the opportunity to learn.

Of course, with the youngest children many of the more "advanced" adult techniques are impractical. Two-year-old quarrels, as the data have shown, are likely to be fleeting affairs. With the short attention span of children of two, their contacts with others are brief. It would be useless to try and help them to become working partners in a co-operative play scheme, for example, and explanations, for them, have to be especially simple and clear. Diverting will be a useful technique when their investigative contacts interfere too much with the activities of others.

Adult methods of dealing with aggressive behavior in the nursery school will always have to be gauged to meet the special needs of each child. Children who are suffering from basic frustrations or from fear will need much more help from the teachers than is involved simply in dealing with their aggressive acts. These children, especially, will need the security of a warm and stable relationship with the adults in the school. Mary and Edmund whose cases were described above were in need of reassurance from such a relationship. Mary apparently felt insecure and resentful. The teachers, therefore, were careful to avoid a condemnatory and disapproving attitude in dealing with her aggressive acts, and on all occasions to treat her with a steady unswerving affection. This policy produced a relaxation of her tenseness and a less hostile attitude towards the other children. Probably because she felt more secure, she felt less need to fight.

Children who are fearful and guilty about their aggressive feelings need reassurance, too. This was apparently Edmund's chief need. He had a good deal of pent-up hostility, especially towards adults, which gave him a bad conscience. The teacher, while not allowing him to hurt her, accepted the threats that he would "kill" her, with good humor. She gave him to understand that she knew how he felt and that she liked him anyway. This attitude seemed to relieve his feelings of guilt, and he became freer and happier and began to concentrate on constructive play for long periods of time.

It also helps, in cases such as this, if the teacher provides plenty of harmless outlets for destructive aggression, for example, clay which can be thumped and squeezed, nails which can be hammered, balls which can be kicked and punched. Edmund enjoyed sawing a tree stump and naming it various people as he did so. But in the case of both Mary and Edmund the adult's steady support through thick and thin was probably the most important factor in relieving inhibiting fears and resentment, reducing the need of hostile aggression, and releasing energy for normal activities.

When there is a relationship of mutual confidence between teacher and child, the teacher can help children in their dealings with each other in the nursery school in the many ways which have been discussed. One way will be by keeping "hands off" on many occasions and encouraging self-reliance on the part of the children in the settling of disputes. Another way will be by resolving tense situations decisively or by setting limits upon conduct which is dangerous or too inconsiderate. But wherever possible the teacher will try to increase the *desire* to consider others through helping children to understand each other better and by giving them usable techniques of cooperation. The goal should not be repression, but the release of energy for the healthful and vigorous forwarding of constructive activities.

SUMMARY

Method and Scope of the Study. This study deals with the aggressive behavior of nursery school children, two, three and four years of age and teachers' methods of dealing with this behavior. The main data of the study were obtained through direct observation by the investigator in nursery schools. Another worker made simultaneous but independent records of 69 episodes of aggression and an agreement of 91% was attained.

Observations were made in fourteen different nursery schools, six of which enrolled children of high socio-economic status and eight of low socio-economic status. The average I.Q. of the children in the privileged group was 114 and in the less-privileged group, 94. The total number of aggressive episodes recorded was 641, involving 232 different individual children. In a few episodes more than one aggressor appeared. Therefore there were 650 "aggressor units", defined as one aggressor in combination with a victim or victims.

Findings. Thirty-six per cent of the aggressive episodes fell in the category, *desire for the possession of property*. Interest in things per se decreased with age, 42% of the aggressor units coming under this heading among the two-year-old aggressors and only 27% among the four-year-old aggressors.

In the less-privileged schools a larger proportion of the episodes are found in the category *desire for possession of property*, 44% as contrasted with 30% in the privileged schools. On the other hand children fought more because of *cross-purposes* in the privileged schools than in the less-privileged schools, 16 as compared with 6% of the episodes in the respective groups falling in this category. There was some evidence to support the hypothesis that this difference was due to the higher level of intelligence of the children in the privileged schools. In the latter, play schemes seemed to be more elaborate, so that differences of opinion as to methods of play might be more likely to arise.

Four-year-olds tend to carry their aggressive behavior into more stages, or "rounds" than do two-year-olds and they precipitate situations in which there is more frequently some display of emotion. Sixty-seven per cent of the aggressions of the fours-versus-fours went beyond one stage, as against 40% of the two-versus-two aggressors. Fifty-five per cent of the four-versus-four aggressions were accompanied by emotional manifestations as compared with 37% of the two-versus-two aggressions.

As victims of aggression, four-year-olds tend to meet the situation more positively and effectively than the two-year-olds. A larger proportion of *directed behavior* (as contrasted with crying or withdrawing) was found among the fours (81%) than among the twos (54%). Moreover, a larger percentage of the twos' behavior came under the heading *no overt reaction* than was the case with the fours'; the per cents are 24% in the former case and 12% in the latter. Furthermore two-year-olds' *directed behavior* was effective in prevailing over the aggressor 57% of the time whereas, in the case of the four-year-olds, it was effective 67% of the time.

The quantitative data of the study were supplemented by studies of six individual children, which showed that the characteristics of a given child's aggression will depend not only upon his age and intelligence and to some extent upon his socio-economic status, but also upon his individual life experiences.

The amount of adult intervention varied in the different schools from 22 to 58% of the episodes. There was intervention in 51% of the episodes in which the victims of aggression appeared ineffective, as against 37% of the episodes in which they appeared effective.

Techniques which were employed by the teachers were evaluated as to their effectiveness in settling conflicts and as to their "goodness". Among the techniques apparently designed to end quarrels, *diverting* and *separating* were both very successful (93 and 85% effective, respectively). *Diverting* appeared to be a good technique 95% of the time and *separating* 74% of the occasions on which it was used. Arbitrary decisions were much less successful, having been effective 65% and good only 57% of the time.

Among the *teaching* techniques, *interpreting the wishes and feelings of one child to another* met with a considerable measure of success (71% effective) and was appraised good 89% of the times it was used. *Explaining property rights* was an almost equally effective technique (69% successful), but met the standard for goodness only 42% of the time. This was due to the fact that explanations were often not clear. *Suggesting a solution* was 66% effective and 83% good. The

more definite a suggestion the greater the likelihood of its acceptance.

Disapproval or moralizing appeared to be a poor technique. It frequently expressed an attitude of irritation on the part of the teacher and probably because of this was effective in settling conflicts only 40% of the time.

Some of the adult methods used lacked realism or practicality. If a teacher says, "we don't hit," it is contrary to the facts—unrealistic. Among nursery school children hitting is sometimes necessary to maintain self-respect. An example of a technique which usually proved impractical was asking children who were quarreling to "talk about it". This suggestion was only 33% effective in resolving conflicts.

Techniques were poor if the adult appeared to misunderstand the situation, if her attitude was unsympathetic or lacking in straight-forwardness or sureness, if directions or explanations were not clear, if undesirable attitudes were encouraged, and if the children's purposes seemed to be blocked unnecessarily.

Certain general principles for guiding the aggressive behavior of young children emerged from this investigation:

The teacher's attitude should be one of sincerity and warmth.

The needs of individual children must be considered. Some children need a more rather than a less aggressive attack on life. With some, undue aggressiveness is related to basic fears and resentments. Such children especially need the emotional support of the teacher. Some of their aggressiveness can find outlet if they are provided with nails to hammer, clay to squeeze and balls to kick and punch.

Teachers should not intervene too readily in children's conflicts. Children will teach each other a great deal. Too much interference prevents self-reliance.

Intervention, however, is called for on occasion to prevent injuries, to cut emotional tension, to set necessary limits, if a child is unduly inconsiderate, to teach self-defense, to give children an increased understanding of each other, and to foster a willingness to cooperate.

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A STUDY OF THE EFFECT OF AN EDUCATIONAL PROGRAM UPON LANGUAGE DEVELOPMENT AND RELATED MENTAL FUNCTIONS IN YOUNG CHILDREN[1]

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BACKGROUND

A survey of the literature in the field of language development and intelligence indicates that in young children there is a high relationship between language ability and intelligence and that language ability is more closely related to mental age than to chronological age.

It has also been demonstrated that in measures of language achievement and of mental ability children of the upper occupational levels are definitely superior, at least at the younger age levels, to children of the lower occupational levels. It was found that certain children living in a very meagre environment were retarded in language ability even for their mental age. There was also evidence to indicate that certain superior environments have been effective in improving scores on tests of language ability and intelligence.

Attempts to analyze the factors in good environments that are associated with superior language development have found positive correlations with such items as association with adults, access to books, hearing stories, and suitable extensions of the environment through trips and excursions.

It has also been found that there is a fairly high correlation between certain types of information and both chronological and mental age, and that children from inferior environments did not receive as high scores on information tests as children from superior environments.

Whether superior intelligence is the result of superior language ability, or whether superior language ability is the result of superior intelligence, whether children in superior environments are high in both partly because of their environments, are exceedingly complex questions. It is possible that intelligence and vocabulary are a function of the same situation and that conditions which favor or hinder the one will favor or hinder the other. Similarly, mental ability and language ability may be regarded as overlapping.

How would children in a meagre environment respond if some of the factors known to be related to good language development were supplied intensively? What would be the effect upon language development and upon related mental functions if these children were to receive attention from an adult who would emphasize the understanding of words, encourage conversation, provide the children with pictures, and read stories to them? Would a more adequate language ability contribute to improved thinking?

Language ability may be defined as the capacity to understand language as used by others (this involves the capacity to respond adaptively to the language of others) together with the capacity to express one's own meanings clearly. Both these aspects involve a grasp of the meanings of language symbols.

It seems that certain mental processes would be handicapped by an inadequate understanding of language symbols as used by others, and that an inadequate command of verbal symbols would handicap verbal responses. Probably an inadequate understanding of verbal symbols is more incapacitating than an inadequate use of such symbols. An important component of intelligent activity is the ability to get meanings from one's environment. If the situation is meaningful to the individual, he can respond more adaptively. Certainly with increasing age linguistic symbols carry a greater burden of meaning to the child.

Certain mental operations can be tested or measured only through a medium which demands the use of language, and practically all tests require that the child understand language. Likewise, in other than test situations the child's understanding of language is most frequently the medium by which one gauges his ability. Even though it is possible to have mental "sensations" that are not distinctly

[1] Carried on at the Iowa Child Welfare Research Station, University of Iowa.

verbal, linguistic symbols serve as the most important tool in thinking. Inability to manage linguistic symbols may, then, result in a definite handicap to mental functioning; facilitating the management of these symbols may correspondingly effect improvement in mental functioning.

Purpose and Method

Purpose. The purpose of this study may be stated as follows:

1. To investigate the effect of an educational program which emphasizes training in the understanding and use of language symbols upon language development and related mental functions.

2. To throw light upon some of the factors that may stimulate language growth by supplying some of them intensively.

3. To investigate the relation between language development and mental functions by comparing certain mental performances before and after intensive language stimulation.

Method. In brief, the method used in this investigation was to apply to an experimental group of preschool and kindergarten children living in an orphanage an educational program stressing some of the factors known to be related to superior language development, and to compare the performances of the experimental and a control group on initial and final measures of language ability and other mental functions.

Types of Training. There are in the literature, particularly in the field of education with reference to reading and reading readiness, many suggestions as to the types of experiences considered valuable in promoting language development.

All the writers are in general agreement, and the following summary of McKee's[1] suggestions for the development of vocabulary and comprehension is typical:

Rich, varied and meaningful experiences.

The use of pictures and drawings.

Opportunity for informal discussion for the exchange of experiences and ideas, for questioning and for simple explanations.

Much simple explanation by the teacher of new and partially familiar concepts.

Determined effort to make the child feel dissatisfied with lack of meaning concerning anything he encounters and to encourage him to ask frankly for such meanings.

Much oral reading and story-telling by the teacher in which new concepts and meanings are presented in sufficiently familiar settings to insure clear understanding.

From suggestions such as these the experimenter included in the program four types of training. These were:

1. Training in the understanding of words and concepts.
2. Looking at and discussing pictures.
3. Listening to poems and stories.
4. Going on short excursions.

Selection of Words and Concepts. It seemed to the experimenter that lists of words used by kindergarten and first-grade children, words found in primers and early readers, and those found with high frequency in the written vocabulary of adults, might provide a helpful objective for part of the training. From such lists one could select frequently appearing verbs, abverbs, prepositions, and so on, to be used in the training program.

Accordingly a total of 1,455 words was chosen from original compilations made by Ernest Horn,[1] Madeline Horn,[2] the International Kindergarten Union,[3] Stone,[4] and the Committee on Vocabulary Selection of a Conference on the Teaching of English to non-English Knowing Pupils.[5] In making this total only basic forms were listed, except that irregular comparatives and common semantic variations were entered separately. To facilitate presentation these words were classified into related groups, for example, "Food and Eating," "Concepts of Number," "Clothing" and the like.

[1] McKee, Paul: Vocabulary development. [In] The Thirty-Sixth Yearbook of the National Society for the Study of Education. Part I. The Teaching of Reading: A Second Report. Bloomington, Ill.: Public School Publishing Co., 1937. (277–302)

[1] Horn, Ernest: The commonest words in the spoken vocabulary of children up to and including six years of age. [In] The Twenty-Fourth Yearbook of the National Society for the Study of Education. Part I. Report of the National Committee on Reading. Bloomington, Ill.: Public School Publishing Co., 1925. (161–232).

[2] Horn, Madeline D.: The 1003 words most frequently used by kindergarten children. Childhood Educ., 1926–1927, 3, 118–122.

[3] Child Study Committee of the International Kindergarten Union: A study of the vocabulary of children before entering the first grade. Madeline Darrough Horn, Chairman, Washington, D. C.: International Kindergarten Union, 1928.

[4] Stone, Clarence R.: Better primary reading. St. Louis: Webster, 1936.

[5] Conference on the Teaching of English to non-English Knowing Pupils, New York, 1934: Interim Report on Vocabulary Selection for the Teaching of English as a Foreign Language. Prepared by the Committee on Vocabulary Selection. London: P. S. King and Son, 1936.

Not all of the words in the list were used in individual training periods. Those pertaining to stores were discussed during the actual excursion to stores. Some of the words were not included in the training program because of the limitations of time. Some of these were of such a nature that they were already familiar, or else did not lend themselves to direct training; for example, personal pronouns, structural helping verbs and contractions.

Selection of Pictures, Stories and Excursions. A large number (845) of pictures was collected from various sources, chiefly magazines. An attempt was made to include pictures of various types (colored, black and white, photographs, line drawings), but the chief criterion of selection was that the picture should be as clear and as accurate as possible. Many of these pictures were related to the categories of the classified list of words, but they were not limited to those areas.

The poems and stories read to the children were selected from those used in the Junior Primary of the University of Iowa Elementary School and in the preschool laboratories of the Iowa Child Welfare Research Station.

The six excursions chosen were determined by the children's interests and requests, but they were limited by accessibility and convenience of arrangements for transportation. It was difficult to take more than two or three children at a time. On the one occasion when a larger group was taken, it was necessary to have the assistance of an older orphanage girl. On that occasion the amount of contact between the experimenter and each child was so appreciably diminished that it was felt that the stimulation value of such an excursion did not justify the time and labor involved.

Procedure in Individual Training Periods. In planning the course of the training program it was decided that the categories of the classified list of words be used as focal points for the individual training periods. In this way groups of related concepts and ideas could be treated together. Thus a period devoted to things to eat or to home furnishings possessed a unity, a belongingness. The acquisition of ideas, it was felt, would be facilitated when they were introduced by thus fitting them into a pattern or setting.

In advance of each period "Suggestions for Training," based upon materials pertaining to the teaching of beginning reading and English to young children, were prepared. The exact wording of the "suggestions" was not necessarily followed, since they were intended only as guides to the experimenter. Neither was the exact order of words within any given category followed, for the situation was adapted as much as possible to the child's interests and needs.

The general plan for each training period was first, systematically to go through the list of words selected for that day, finding out what concepts the child seemed to know and what ones he was unsure about. The remainder of the period was devoted to teaching the child the meaning of those words for which he lacked understanding. It should be pointed out that if the child could not respond to a word the very first time it was presented, the experimenter told him the answer, explaining and demonstrating as the case demanded.

In general, then, the plan was to focus attention in the more formal individual training period upon the series of words and concepts indicated for that day, but by no means to restrict conversation to that category. While the experimenter made definite efforts to make the conversation as instructive as possible from the point of view of language development, she attempted also to avoid a stilted and pedantic atmosphere.

It must be stressed that the emphasis was not on stuffing children with words. The aim was not mere memory of the correct form in a particular situation, but real comprehension of the words and concepts. To that end the experimenter endeavored constantly to give the referent for each symbol in so far as possible, to make it meaningful by using the word in a variety of settings, and to extend each child's present level of understanding and use.

Procedure in Group Training Periods. Group periods were devoted to such experiences as excursions, stories, and discussion of pictures. In a few instances some of the older children were taken in groups of two or three for training in concepts. Only rarely were more than four children taken at one time for training; most often there were two or three children in a group.

In showing the pictures the experimenter exposed them one at a time. She waited a few moments for the child to look at the picture and to give him an opportunity to offer the first comment. In the type of comments made

TABLE 1

INITIAL TESTS—RANGE AND MEANS

	Experimental		Control		
	Range	Mean	Range	Mean	t
Chronological Age	43 — 82	64.4	43 — 80	63.9	N. S.
Mental Age	29 — 70	52.7	30 — 67	52.7	N. S.
IQ	65 — 92	80.6	68 — 92	81.5	N. S.
Vocabulary	4 — 52	23.7	5 — 37	22.6	N. S.
Information (I)	8 — 48	23.5	4 — 38	23.1	N. S.
Information (II)	3 — 35	15.9	3 — 30	16.9	N. S.
Intelligibility	4.3 — 10.	7.7	3.3 — 10	7.6	N. S.
Organization	18 — 28	24.2	15 — 27	23.5	N. S.

and questions asked about the pictures the experimenter attempted to provide the children with stimulating information and to challenge the child to think carefully and constructively.

In presenting the stories the experimenter tried to make them as meaningful as possible. She made liberal use of synonyms and explanatory phrases, and frequently checked up on the child's comprehension.

In group periods the children were encouraged to ask questions and to make comments freely. To this end the experimenter asked leading questions, supplied words when the children hesitated, and endeavored to be a sympathetic listener.

General Procedures. In all contacts with the children the experimenter tried to introduce new words and phrases as much as possible and at the same time to make them understandable by liberal use of explanatory phrases. She also attempted to stimulate curiosity, to help the children think critically, to notice relationships, causes and effects, and to eliminate careless thinking and the careless use of language symbols.

There was little stress upon grammatical correctness, for one of the primary aims was to encourage the children to talk, and too much correction of their frequent errors would have discouraged them.

SUBJECTS AND COLLECTIONS OF DATA

Selection of Subjects. The subjects for this investigation were chosen from the children who attended the preschool and the kindergarten of the Iowa Soldiers' Orphans' Home. There were eleven pairs of children, plus one additional experimental-group girl for whom no control was available. These children were matched upon the basis of school group, sex, chronological age, mental age and IQ on Form L of the New Revision of the Stanford Binet, and upon score on the Smith-Williams Vocabulary Test.[1]

Additional initial tests consisted of the Home Living and the General Science section of an information test developed by Maughan[2] and by Lancaster,[3] and the Intelligibility and Organization sections of the Little-Williams Language Achievement Scale.[1]

Comparison of the two groups revealed that there were no significant differences between them in age, mental age, IQ, vocabulary score, home living score, general science score, intelligibility, or organization score.*

Living and School Arrangements for the Subjects. The children lived in cottages, segregated according to sex, about twenty-five children to each cottage. The preschool was in session each week day from about 8:30 to 11:30 or 11:45, and from soon after 3 o'clock until about 4:45. The kindergarten was in session each week day from 8:45 to 11:15, and from 1:30 to 3:45.

The orphanage environment was certainly different from the situation for children who live in their own homes. The adult-child ratio in the orphanage was low. There was about one adult to ten or twelve children in the cottages for the younger children, and one adult to about twenty or twenty-five children in other cottages. In the kindergarten the ratio was one to twelve or fifteen; in the preschool about one to seven or eight children.

Their environment was particularly deficient in experiences that might stimulate verbal expression much beyond the level of making wants known. Outside of school the children

[1] Williams, Harold M., McFarland, Mary, and Little, Marguerite F.: Development of language and vocabulary in young children. Univ. Iowa Stud., Stud. in Child Welfare, 1937, 13, No. 2, Pp. 94.

[2] Maughan, Nona: An information test for children of preschool age. I. Home Living. Unpublished Master's thesis, University of Iowa, 1937.

[3] Lancaster, Elizabeth T.: An information test for children of preschool age. II. General Science. Unpublished Master's thesis, University of Iowa, 1937.

* See Table 1.

had very little conversation with adults. Only very rarely did anyone read stories to them, and these were generally of poor quality and not adapted to their level of understanding. The children had few toys and almost no constructive play materials except at preschool and kindergarten. They had few opportunities to leave the orphanage grounds. They were quite lacking in the kind of experiences that children have in their own homes in the way of sharing in or observing daily household activities, walking with adults to stores, visiting, r i d i n g in automobiles through city streets, into the country or to other towns. For the most part their daily routine was monotonous and the level of stimulation low.

After training had begun there were some changes which created differences in living arrangements for the subjects, such as alterations in cottage assignment; it is not felt, however, that these changes produced any great advantage or that they operated in any constant direction. Four of the children left the orphanage before the end of training and before final testing was completed. Of these one control child was moved to another state institution for dependent children late in April. Of the children who were placed with private families one control child left on May 10th, another on May 29th; an experimental child was placed in a boarding home on May 19th. The chances are slight that t h e s e changes could have operated in the short space of time before final testing so as to produce differences of any material size.

Types of Data Collected. The data collected consisted of comparisons between initial and final tests, of comparisons on some additional final tests, and of certain records of the children's responses during the training program. The additional final tests were Form M of the New Revision of the Stanford Binet, Arthur Point Scale of Performance Tests[1] (given to the six oldest pairs) and Van Wagenen Reading Readiness Tests[2] (given to the seven oldest pairs). The records taken during the course of training consisted of: (a) the frequency of the child's attempts to leave the situation or of lapses in attention sufficient to require some comment by the experimenter; (b) the frequency of intellectual questions asked by each child; (c) the frequency of critical remarks; and (d) comments indicating a perception of relationships, similarities or differences, generalizations and interpretations. For the verbal responses it was possible to obtain verbatim records in most instances.

A tally was entered under "Attempts to leave the field" each time the child attempted to withdraw from the situation; for example, if he said "When are we going back to the cottage?" or started to look out the window or play with the treasures in his pockets. Accidental interruptions or disturbances which distracted attention were not recorded, since they were not initiated by the child. The experimenter recorded only those instances in which it was necessary for her to speak to the child.

Under "Asks intellectual questions" a tally was made each time the child spontaneously requested any information of an intellectual sort; that is, any question which indicated a desire for information which would contribute to his understanding of his environment. No entry was made for such questions as "Will you tie my shoe?", "Can I have that pencil to keep?", "Can I come with you tomorrow?" S o m e examples of questions which were recorded are: "What's t h a t thing?", "What color is that pencil?", "How did you make that?"

Under "Makes critical comments" an entry was made each time a child spontaneously corrected an error of his own making, an erroneous comment by another child, or criticized constructively his own responses. Examples of such comments are: "That ain't red, it's pink," "Birds don't eat snakes; them is worms," "I counted wrong; there's ten of them."

Under "Comments on relationships, etc." a tally was made each time a child's comment indicated that he had noticed a similarity or a difference, had drawn a conclusion or made a generalization, perceived a relationship or made an interpretation. Instances are:

They all three got hair just alike.

People don't eat bugs. Just birds do.

Maybe that baby is crying 'cause a girl slapped her.

Just like that picture almost. This is darker and that ain't.

You can break glass and dolls.

[1] Arthur, Mary Grace: A point scale of performance tests: Clinical manual. New York: Commonwealth Fund, Division of Publications, 1930, Vol. 1. Pp. 82.

[2] Van Wagenen, M. J.: Reading readiness tests (manual). Philadelphia, Minneapolis: Educational Test Bureau, 1932.

We had asparagus at the dining-hall (too). Jimmy ate his but I didn't eat mine, etc., etc.

In recording these comments only one tally was made for a comment on a particular point even though the comment might consist of a series of remarks, as in the last example above.

Comments which were not entered were: the mere naming of objects seen in a picture, direct answers to the experimenter's questions, duplication of another child's comment, or simple descriptions or comments which contained no pointing out of relationships; for example, "I see two birds," "There's a dog," "Look at the airplane up in the sky."

Test Examiners. All tests were given by experienced examiners. An effort was made to have initial and final tests given by different examiners, but this did not prove possible in every case. Where repetition by the same person was necessary and when the experimenter had to do any testing, an attempt was made to assign those tests in which the examiner's subjective judgment might have least effect. No one who assisted in the testing was told which were experimental and which were control children. It was necessary for the experimenter to give all final tests to the four children who had left the orphanage. These were the only cases in which the experimenter gave the final mental tests.

Time of Training. Training began on November 4, 1938, and continued, chiefly on week-ends, for a total of 92 days, until June 16th, 1939. The average amount of training received by each child was nearly 50 hours. This of course constitutes a small amount in proportion to the total amount of time that the child was exposed to the orphanage environment.

Analysis of Data

Initial and Final Comparisons. Comparison of the experimental and control groups on initial and final measures is presented in Table 2.

As measured by Form L of the New Revision of the Stanford-Binet, the experimental group gained 14.2 points in IQ, from an intial mean of 80.6 to a final mean of 94.8. This change was significant at the 1 per cent level. The control group lost 2 points in IQ, from an initial mean of 81.5 to a final mean of 79.5. This change was not significant. The mean difference in size of change, 16.2 points in favor of the experimental group was significant at the 1 per cent level.

On the Smith-Williams Vocabulary Test both groups made gains significant at the 1 per cent level. The experimental group gained 17.5 points from an initial mean of 23.7 to a final mean of 41.2. The control group gained 10.0 points from an initial mean of 22.6 to a final mean of 32.6. The experimental group, however, made a significantly greater gain, since the mean difference in size of change, 7.5 points, was significant at the 1 per cent level.

For both groups, correlations between age and vocabulary score, between mental age and vocabulary score were high, both at the beginning and at the end of training. The correlation between age and initial vocabulary score was .91 for the experimental and .89 for the control group. Between age and final vocabulary score the correlation was .93 for the experimental and .81 for the control

TABLE 2

INITIAL—FINAL COMPARISONS

	Terman Form L		Smith-Williams Vocabulary		Home Living Information		Science Information		Intelligibility		Organization	
	E	C	E	C	E	C	E	C	E	C	E	C
Initial Range	65–92	68–92	4–52	5–34	8–48	4–38	6–35	3–30	4. 3–10. 0	3. 3–10. 0	18–28	15–27
Final Range	85–108	62–87	20–59	13–47	26–54	10–46	19–40	11–34	5. 3–10. 0	4. 2–10. 0	24–31	25–31
Initial Mean	80. 6	81. 5	23. 7	22. 6	23. 5	23. 1	15. 9	16. 9	7. 7	7. 6	24. 2	23. 6
Final Mean	94. 8	79. 5	41. 2	32. 6	41. 5	33. 7	29. 2	21. 8	8. 5	8. 0	28. 5	27. 6
Mean Change	14. 2	—2. 00	17. 5	10. 0	18. 1	10. 6	13. 3	4. 9	. 77	. 38	4. 3	4. 0
Level of Significance	1 per cent	N. S.	1 per cent	1 per cent	1 per cent	1 per cent	1 per cent	1 per cent	N. S.	N. S.	1 per cent	1 per cent
Mean Difference in Size of Change in Favor of E	16. 2		7. 5		7. 5		8. 4		. 89		. 27	
Level of Significance for this Difference	1 per cent		1 per cent		1 per cent		2 per cent		Not Significant		Not Significant	

group. The correlation between mental age and initial vocabulary was .92 for the experimental and also for the control group. Between mental age and final vocabulary the correlation was .93 for the experimental and .84 for the control group.

On both sections of the information test both groups made significant gains, but those made by the experimental group were significantly greater. On Home Living the experimental group gained 18.1 points from an initial mean of 23.5 to a final mean of 41.5. The control group gained 10.6 points from an initial mean of 23.1 to a final mean of 33.7. Changes for both groups were significant at the 1 per cent level. The mean difference in size of change, 7.5 points in favor of the experimental group, was significant at the 1 per cent level. On the science section the experimental group gained 13.3 points from an initial mean of 15.9 to a final mean of 29.2. The control group gained 4.9 points from an initial mean of 16.9 to a final mean of 21.8. For both groups the changes were significant at the 1 per cent level. The mean differences in size of change, 8.4 points in favor of the experimental group, was significant at the 2 per cent level.

On the intelligibility section of the language achievement scale both groups gained, but the gains were not significant. The experimental group had an initial mean of 7.7 and a final mean of 8.5. For the control group the initial mean was 7.6 and the final mean 8.0. The mean difference in size of change was .39 points in favor of the experimental group but the difference was not significant.

On the organization section of the language achievement scale both groups made gains that were significant at the 1 per cent level. The experimental group gained 4.3 points from an initial mean of 24.2 to a final mean of 28.5. The control group gained 4.0 points from an initial mean of 23.6 to a final mean of 27.6. The mean difference in size of change was .27 points in favor of the experimental group, but this difference was not significant.

Comparisons on Additional Final Tests. On Form M of the New Revision of the Stanford Binet the experimental group at the end of training received a mean of 94.5; the mean for the control group was 84.5. The mean difference of 10.0 points in favor of the experimental group was significant at the 1 per cent level.

When Form L was compared with Form M it was found that the difference between the two forms was slight (.27 points in favor of Form L) and not significant for the experimental group. For the control group, however, there was a difference of 5.1 points in favor of Form M, and that difference was significant at the 5 per cent level. In both groups Form L was given first, and we might expect to find a slight difference in favor of Form M of about 2 IQ points (according to Terman and Merrill). A possible explanation for the difference in results between the two groups may lie in the fact that the experimental children, who were superior on both tests, were superior to the control children on the vocabulary test in Form L, while Form M has no vocabulary test.

On the Arthur Point Scale of Performance Tests the experimental group (using the six oldest pairs) had a mean of 98.7. For the control subjects the mean was 93.2. This difference, in favor of the experimental group, was not significant. When these same pairs were compared on Form L the mean difference between the pairs was 14.8 points in favor of the experimental group. This difference was significant at the 2 per cent level. When they were compared on Form M the mean difference was 10.5 in favor of the experimental group, and it was significant at the 5 per cent level. These results show a progressively greater difference in favor of the experimental group as one goes from the performance test to those containing a greater proportion of verbal material.

On the Van Wagenen Reading Readiness Tests (given to the seven oldest pairs) the experimental children were superior on all means for subtests, and all differences (except those for range of information, memory span and word discrimination) were significant. The difference on vocabulary opposites would have been significant at the 5 per cent level if t had been .027 points higher. In only nine of the forty-nine comparisons possible between individual pairs did a control child surpass an experimental child.

Correlation with Change in IQ. The correlation between change in IQ and age was —.72; between change in IQ and per cent of time spent in individual training it was .65. Both of these correlations were significant. Correlations between change in IQ and change in vocabulary score, change in home

living score, change in general science score, and initial IQ were not significant. The correlation between age and per cent of time spent in individual training was —.93, and that was significant.

Change in Frequency of Responses to Training. From preliminary analysis it was apparent that the frequency of the various responses varied between the picture, concept and story type of training. Accordingly, these three types of training were not grouped together in analyses of the change in frequency of attempts to leave the field, number of questions, and of criticisms and comments. The critical remarks were combined with the comments, since the former were too infrequent to justify separate treatment.

To show the change in frequency of reponses, the number made per hour in November and December was compared with the number made per hour in May and June. November and December were chosen because it was felt that records made in October would reflect chiefly initial adjustment to the program and make the contrast unduly large. Results of the several types of analyses of responses to training are presented in Table 3.

Comparisons at the earlier and later periods of picture training show a significant decrease in attempts to leave the field (from 3.06 attempts per hour to .11); a significant increase in number of intellectual questions per hour (from 2.64 to 10.55), and a significant increase in critical remarks and comments (from 4.52 to 13.97 per hour).

In comparing changes during concept and story training the number of questions, criticisms and comments were grouped together, since the frequency of these responses did not justify separate analysis. In concept training there was a significant increase in these responses from 3.44 to 5.96 per hour. In story training the increase was also significant (from 5.96 to 9.15 per hour).

It seemed possible that differences in the materials being used at the beginning and end of the training might have been responsible for some of these changes in the number of responses made. The data collected offered an opportunity to compare changes in response at the beginning and end of training using the same types of material.

During the first part of June the subjects were shown the same pictures (a total of 163) that had been presented during the latter part of November and the first part of December. In so far as possible the same children who were together in groups the first time were taken together for this second showing. The increases in the number of questions asked (from 2.48 to 11.60 per hour) and in the number of criticisms and comments made (from 3.61 to 15.48 per hour) were all significant.

In counting the number of words to each sentence, the experiment adhered to a strict standard of what constituted a sentence. Often the child's comment gave the impression that the phrases were all one related sentence; for example, "That's not a boy; it's a girl" or "Two on top, two on the bottom." In counting the sentence length for this analysis, however, both examples were treated as consisting of two separate sentences.

The length of sentences as the training progressed tended to be underestimated, because as the children talked more it became increasingly difficult to record the entire re-

TABLE 3

CHANGES IN RESPONSES IN TRAINING

Type of Comparison	Initial	Final	Change	Level of Significance
Picture Training				
Leaves Field	3.06	.11	2.95	1 per cent
Asks Questions	2.64	10.55	7.91	1 per cent
Comments	4.52	13.97	9.45	1 per cent
Concept Training				
Questions plus Comments	3.44	5.96	2.52	1 per cent
Story Training				
Questions plus Comments	5.96	9.15	3.19	5 per cent
Same Pictures Repeated				
Questions	2.48	11.60	9.12	1 per cent
Comments	3.61	15.48	11.87	1 per cent
Mean Sentence Length	5.34	6.14	.80	1 per cent
Other-than-simple Sentences	.39	1.09	.70	1 per cent

mark. Frequently the verbatim record would contain a series of words and then "etc., etc." In counting the number of words per sentence only those actually written down, not including the "etc." were counted.

In order to investigate the change in mean sentence length, comparisons were made of the criticisms and comments made in January and February with those made in May and June. January and February were chosen instead of November and December because preliminary analysis indicated that the earlier records were usually all complete, whereas the later ones, as mentioned above, tended to be condensed. All types of training were grouped together in making these analyses, because the verbatim records had not been kept separately for each type of training. The comparisons are presented in Table 3.

The mean number of words per sentence in January and February was 5.34; in May and June it was 6.14. This increase was significant at the 1 per cent level.

In analyzing the children's remarks for sentence complexity, the same strict standard as to what constituted a sentence was applied as described in the method of computing sentence length. The compound, complex, and the compound-complex sentences were considered together as "other-than-simple" sentences, since the frequencies for the separate types were small.

Comparisons were made between the number of such sentences per hour in November and December and the number per hour in May and June. These data are presented in Table 3. The number of other-than-simple sentences increased from .39 per hour at the beginning of training to 1.09 per hour at the end of training. The difference was significant at the 1 per cent level.

Conclusions

Although the actual number of hours of training received by the experimental group was small relative to the total number of hours that they were exposed to the orphanage environment, it was found that substantial changes had occurred in these children by the end of the training period.

On no final test means or changes in score were the control children superior. On tests of vocabulary, of home living information and of general science information the experimental group made significantly greater gains than the control group. The experimental group gained significantly in IQ while the mean change for the control group was a loss of 2.0 IQ points. On final tests of intelligence the experimental group was significantly superior, except on the Arthur Point Scale, where its superiority was not significant. These children were also significantly superior on Mid C-Score in the reading readiness tests.

Results from the analysis of records taken during the training periods indicated that the experimental children made changes in the direction of improvement in language ability as measured by mean sentence length and sentence complexity. Increase in the number of intellectual questions and critical comments reflected an increasing use of verbal expression and more frequent analytical remarks. It is probable that some of these changes were due to increase in age; some of the changes, however, were so large as to indicate additional factors.

Correlations indicated that change in IQ was related to the per cent of time spent in individual training. It was also shown that age was negatively related to the change in IQ, and that age was negatively related to the time spent in individual training. It is possible that the larger amount of individual training received by the younger children meant that they received training better suited to their individual needs. It is also possible that the training was not geared high enough for most of the older children, or that the older children were less modifiable, or both.

It was the purpose of the experimenter to provide these children with some of the segments of the social heritage that their specific environment failed to offer, with particular reference to linguistic symbols that serve as "intellectual tools." It was found that, after training, the children were better able to adapt to the conditions they met, and that some of the things they learned were typical of the functional adaptation the human being is required to make.

It was the experimenter's aim to give these children skills, knowledge and attitudes that would enable them to act more effectively. Their biologically-given brains have indeed set limits to their achievement. Every "environmentalist," to the writers' knowledge,

would agree with that. But that these children had yet reached their limit seems doubtful. More training, better training and greater motivation should help them proceed further in the utilization of their powers.

The experimenter took special care to see that the training program should include no direct coaching on test items. If it had, it seems possible that large gains would have occurred for every child. However, out of the large number of pictures used and the list of common words and concepts, some of the material would be similar to material in the tests, since the test material was designed to include items that the average child would assimilate from an ordinary environment.

Pertinent, also, is the fact that the training program could provide certain information related to test items without providing training in performing the test item. In the vocabulary test, for example, the child may not be able to give a satisfactory definition of an envelope, even if he could name it on sight. But if he has never seen an envelope or been told what it is, he could not define the word, no matter what his mental age. The child cannot manipulate certain facts if his environment has kept him ignorant of those facts. In this sense, the language training involved in the experiment was analogous to what goes on in the home and school life of any child who is not neglected.

CHANGES IN STANFORD-BINET IQ FOR RURAL CONSOLIDATED AND RURAL ONE-ROOM SCHOOL CHILDREN*

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Rural communities, as other communities, are faced with the problem of providing for the mental growth of their children. Some rural communities provide one-room schools, while others combine several smaller school districts into a consolidated district with one central school. The effectiveness of these different types of schools may not be the same in promoting the mental growth of the children, or the same as that of city schools. Variations in school environment have been shown by several investigators to be related to development of intelligence as represented by the IQ. It was proposed, accordingly to determine if the environment of the two rural school communities was associated with changes in mental growth.

Several studies have shown that intelligence test scores for rural children were below those for urban children (6, 3, 4, 9, 8), and most of these agree in showing that older rural children are more inferior than the younger rural children. Terman and Merrill (10) show that on the standardization cases for the Stanford-Binet scale the youngest rural children are about equal to other groups, but that older rural children are below the mean IQ for any other classification. Baldwin, Fillmore, and Hadley (1) gave repeated Stanford-Binet examinations to consolidated school and one-room school children. There was a tendency for those in the consolidated school to increase in IQ, and a tendency for those in the one-room schools to decrease. They further found that up to the age of five years the rural children were equal to city children with whom they were matched, but that after this age the rural children were inferior.

Methods and Procedures

In the light of these findings it seemed reasonable to set up the hypothesis of this study: *Are children of the same initial IQ and the same age living under the consolidated and one-room school environments still the same in IQ after a relatively long interval?* A rural area was selected in which was located a consolidated school surrounded by several one-room schools. Enough of the neighboring schools (thirteen) were selected so that there would be about the same number of consolidated and one-room school children at the age levels studied. They all lived in a prosperous farming area within a radius of about ten miles.

From a preliminary survey it appeared that the children entering these two groups of schools were about equal in IQ. It was decided accordingly that repeated measurements would be taken on three groups:

Group A—Pupils having their first year of school attendance during either of the two years of the study.
Group B—Pupils having their first two years of school attendance during the two years of the study.
Group C—Pupils having their second and third years of school attendance during the two years of the study.

The children entering the one-room schools were younger, necessitating control of this factor in the analysis. The technique used was the analysis of covariance comparing differences in final IQ, holding initial IQ and chronological age constant. Only children meeting the above attendance requirements, and having attended no other school environments were included. The examinations were given by well trained and experienced psychologists. In each case the full Stanford-Binet scale, Form L was used. Effort was made to hold testing conditions constant, and to make each examination as adequate as possible. The tests were given in the fall and in the spring of both years of the study.

Effort was made to describe the home environment and the school environment as well as available techniques would permit. The

* This study was directed by Dr. Ralph H. Ojemann.

home of each of the children was visited, and measures of the parents' attitudes toward the child and the school were secured. Each of the schoolrooms was observed in an effort to secure a measure of the activities engaged in by the teachers and the pupils. For this, a short-time-sampling was used during which an activity was checked if it occurred during the period of the observation. Ten activities of the teacher and twelve activities of the pupil were observed.

Pupil

1. S reads, or otherwise uses, reference (not immediate text)
2. S reports on something brought in, or verbalizes on his experience for benefit of group, gives illustration or suggestion
3. S gives meaning of word
4. S writes or draws for non-assigned purpose
5. S works on "creative" task of own selection (other than 4)
6. S spends time at something apparently irrelevant
7. S works in cooperation with one or more persons
8. S works in competition with one or more persons
9. S asks pertinent question to curriculum of the moment
10. S gets out or puts away material, or takes or gives material to teacher for change of activity
11. S gives verbatim answer, reads answer from book or paper (verbal only, in response to T's question)
12. S does assigned activity

Teacher

1. T asks S to read for purpose of doing what it tells
2. T tests S's meaning of new word
3. T asks for, or gives oportunity for S to give original illustration, suggestion, or to verbalize his experience for benefit of the group
4. T refers to items not in texts or assigned reference, provides original demonstration, illustration
5. T brings several facts together in generalization
6. T approaches S's mistake or problem analytically (audible level)
7. T was distracted from work with class by other pupil
8. T uses "non-choice" or emergency verbal controls (discipline)
9. T asks for and accepts memorized, formal answer(audible level)
10. T passes out or takes up materials (or directs groups to get out or put away materials) for change of activity

Percent of agreement between two observers taking simultaneous records was found to be 91, dividing number of agreements by total number of items checked. Observations of teacher activity were made at the beginning of each quarter hour and were followed immediately by two pupil observations. This procedure continued for a half-day in each school. Precautions were taken to secure a representative sampling in both the consolidated school and the one-room schools of activities carried on throughout the week.

In addition to these measures, parent education and father's occupation was recorded for each of the children on whom repeated measures were taken. The total number of years' experience, and the number of years' education of the teachers was secured from the school superintendent.

Results

Group A. During the two years of the study there were 34 children who entered the consolidated school for their first year of school attendance and continued in the school until the second test at the end of the year. In the one-room schools there were 30 such cases. On the initial measure there was only one point difference between the two groups, but at the end of the year there was five points difference, as shown in Table I. Holding initial IQ and age constant by analysis of covariance, the difference in final score was significant at the one percent level of confidence according to the F-test of Fisher.

Group B. There were 16 pupils in the consolidated school and 14 pupils in the one-room schools who entered the school for their first year of school attendance in the fall of the first year of the study, and who continued in that school until the spring test of the second year of the study. Upon entering the school the mean IQ's for the two groups were similar, but after two years of school attendance those in the consolidated school were 13 points higher than were those in the one-room schools, as shown in Table I. This

TABLE I

CHANGES IN IQ DURING ATTENDANCE IN CONSOLIDATED AND ONE-ROOM SCHOOLS, HOLDING INITIAL IQ AND AGE CONSTANT

	Consolidated			One-Room			Diff	F_o	Ft	
	N	M	σ	N	M	σ			(1%)	(5%)
Group A	34	111	12.3	30	106	10.4	5	8.7	7.1	4.0
Group B	16	121	20.7	14	108	13.6	13	9.9	7.7	4.2
Group C	13	116	14.7	11	103	16.4	13	3.6	8.1	4.4
Initial IQ										
Group A	34	106	12.7	30	105	9.2	1			
Group B	16	105	13.2	14	104	10.8	1			
Group C	13	112	13.5	11	105	13.6	7			
Initial Age										
Group A	34	73.1	4.1	30	68.1	4.8	5.0			
Group B	16	72.8	3.6	14	66.4	3.7	6.4			
Group C	13	85.6	4.4	11	82.1	4.5	3.5			

difference in final score is significant at the one percent level of confidence, holding initial IQ and age constant by analysis of covariance. It can be noticed that there was a difference in the standard deviations for the final test, but the difference in variance was not significant according to the Bartlett test.

Group C. The pupils in *Group C* had had one year of school attendance in the school environment before the initial measure. As might be expected from the results of the other two groups, those in the consolidated school were higher in initial IQ. This difference in initial measure was 7 IQ points, but at the end of their third year of school attendance the difference had increased to 13 IQ points. As shown in Table I, this difference in IQ at the end of their third year of school attendance was not significant at the five percent level of confidence, holding initial IQ and age constant by analysis of covariance. The number of cases in this group, however, was small and the loss of two degrees of freedom in computing the multiple regression coefficient was more noticeable than it would be in larger samples.

Home Environment. The findings of the measures of home environment show more similarities between the two groups than differences. The mid-parent education for those in the consolidated school was 10.1 years, while that for those in the one-room schools was 9.7. This difference is small and not significant. The occupations of the fathers were divided into three groups: (1) Farm Owners, (2) Farm Tenants, and (3) Non-Farmers. It was thought that a finer classification could not be made since the majority of those in both groups were farmers. The chi-square test was used to test the difference in distributions for the two groups. The chi-square value was found to be 1.57, indicating that as much difference as that found in this sample would be expected in fifty percent of samples of this size simply by chance distribution.

Questions designed to measure the parents' attitudes toward the child and toward the school showed marked similarities in the replies of the parents, and few differences. This is true even though the school itself was considerably different. Five in the consolidated school group and three in the one-room school group said that their child had been taken on a trip for the purpose of seeing something new and interesting during the previous week. ($N = 37$ and 30, respectively). In all but one case the parents said that the child liked the teacher. In reply to the question "What do you think are the most important things a child such as _____ should get from school?" the parents in the two groups gave very similar replies. The replies were classified independently into six categories by two judges, with a resulting percent of agreement of 96. The chi-square test was applied to the distributions of replies of the parents of the consolidated and one-room school children. The chi-square value was not significant, differences as great as those found being expected in seventy percent of samples of this size simply by chance distribution.

School Environment. The findings of the school environment show marked differences between the two groups on the measures used. The teachers in the consolidated school had a mean of 15.0 years' education, while those in the one-room schools had a mean of 12.6 years. This is a significant difference

($t = 4.5$). Fifty-eight percent of those in the latter group had had only twelve weeks training beyond high school, while all of those in the consolidated school had had at least two years of work beyond high school. The average experience of those in the consolidated school was 10.2 years, while that for the one-room school teachers was 5.6 years. The difference is large, although the range in both cases is also large and the mean difference is not significant at the five percent level according to the t-test.

There were four items of observed activity which showed statistically significant differences between the two schoolroom environments. (1) The pupils in the consolidated school more often "Read, or otherwise used, reference (not immediate text)." (2) Pupils in the one-room schools more often "Spent time at something apparently irrelevant." (3) Teachers in the one-room schools more often "Asked for and accepted memorized, formal answers." (4) Teachers in the consolidated school more often "Passed out or took up materials for change of activity." This last point is to be expected since the pupils of the one-room schools often work according to a pre-arranged schedule, or are given relatively long-time assignments. It was the opinion of the observers that the younger children in the one-room schools were left to carry out long-time activities which were beyond their ability in planning and concentration.

Summary and Discussion

The results of repeated Stanford-Binet IQ tests on *Group A* and *Group B*, and the trend in *Group C*, are in agreement in showing gains during the school year on the part of the consolidated school children and slight change or loss on the part of the one-room school children. The children entering the school for their first year of school attendance (*Group A*) were similar in IQ. After a year of attendance in these environments, however, there was a significant difference between the two groups. These results are confirmed by the fact that the children at the beginning of their second year of attendance (*Group C*) in the consolidated school were higher than those beginning their second year of attendance in the one-room schools. During their first two years of attendance (*Group B*) the differences in growth of the two groups was even more marked.

These results present evidence that the development of intelligence as represented by changes in Stanford-Binet IQ is not the same for the children in the consolidated and one-room schools of this study. These differences do not seem to be due to testing conditions since every test was made as adequate as possible, and since effort was made to hold testing conditions constant.

The differences in growth patterns for the two groups do not seem to be associated with differences in home environment, as judged from mid-parent education and occupational level, since these are similar for the two groups. Parents' replies to questions designed to measure the parents' attitudes toward the child and the school are more noticeable for their similarities than their differences.

On the other hand there were marked differences in school environment as revealed by the measures used. The training of the teachers in the consolidated school seemed to be superior as judged from the amount of their education and experience. Pupil and teacher activities, selected because they were thought possibly to be related to mental stimulation of the schoolroom, showed marked differences between the two groups.

Since experiences affect mental growth, care must be exercised in applying the findings of this study to other rural areas. Only in those areas in which the experiences approximate those of this study would we expect to find growth patterns such as those in this investigation. The importance of examining various rural environments as to their effect on mental growth and of developing rural environments which encourage mental growth is indicated.

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THE RELATION BETWEEN ABILITY IN SCIENTIFIC THINKING AND BEHAVIOR IN SITUATIONS INVOLVING CHOICE

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This study is concerned with some of the factors determining the adolescent's use of logical or scientific thinking in situations in which the subject is free to do as he likes, i.e., in situations in which the individual makes his own choice.

In studies of the individual's growth in logical or scientific thinking most of the emphasis has been placed on growth in ability and a number of tests of thinking ability have been devised. It is clear that ability in thinking is one important factor underlying the use of thinking when the adolescent is free to do as he wishes; the question for this investigation is, are there other factors that are also involved?

An analysis of the psychological nature of tests of thinking ability and the conditions under which they are administered seems to indicate that an important distinction may exist between behavior as it occurs in a test of ability and behavior when the subject is on his own. When an experimenter administers a test of thinking ability he attempts to control such factors as motive by urging the subject to do his best, to examine the data carefully, etc. In other words, the experimenter attempts to control such parameters of behavior as motive and the immediate environmental setting, leaving the ability to think critically as the major variable. Variations in behavior from subject to subject as indicated by test scores thus obtained are assumed to be indicative of variations in ability.

When the individual is on his own, however, the subject himself controls the motive and the other factors which in the test situation were relatively controlled by the experimenter. In a situation in which the individual is on his own there is no outsider to tell him to do his best, to establish rapport, to provide the necessary materials and the like. Whether the subject will do his best or his worst is controlled by the subject.

In this study we are interested in determining the relation between thinking scores as obtained on a specified test and the use of thinking by adolescents when they are free to choose. The general plan of the study consisted in obtaining scores on a test of thinking ability for a group of high school freshmen and records of the behavior of the same subjects in situations in which the individual is on his own, which for convenience we may call "choice" situations. In order to study the place of various factors in the picture, data on conflicts, interests, and hiearchy of wants were also obtained.

The subjects were twenty-three high school freshmen in the University of Iowa Laboratory Schools. Chronological ages of the group ranged from 14–1 to 16–6 years. Intelligence quotients ranged from 85 to 130 with an average of 110.8. There were seventeen girls and six boys in the group.

The thinking test consisted of a series of problems, the first six of which, comprising section one, were adapted from Burt's study (1). A typical example from this section is as follows:

> Where the climate is hot aloes and rubber grow. Heather and grass will only grow where it is cold. Heather and rubber require plenty of moisture. Grass and aloes will grow only in fairly dry regions. Near the river A. it is very hot and very damp. Which of the above grows there?
>
> a. grass
> b. heather
> c. aloes
> d. rubber

The items in section 2 consisted of data followed by a number of statements which the subject was asked to mark as follows:

1. If the statement is true according to the data given
2. If the statement is probably true

3. If not enough information is given to prove that the statement is either true or false
4. If the statement is probably false
5. If the statement is definitely false

A typical example follows:

In 1940 somewhat more than 3,000 people in all parts of the United States were asked the question, "Is too much money being spent for schools?"

a. About 19% said not enough is being spent.
b. About 47% said that the amount being spent was about right.
c. About 14% said too much is being spent for schools.
d. About 20% did not say one way or the other.

This was accompanied by the following six statements:

1. More people in 1940 said that too much was being spent for schools than was true in 1935.
2. The people who said that too much was being spent for schools were largely property owners who didn't want to pay high taxes.
3. The group that said that the amount was about right was somewhat more than three times as large as the group that said the amount was too much.
4. Since about half the people think about the right amount is being spent schools are very efficient.
5. The 20% who did not say one way or the other had no children in school.
6. The 19% who said "not enough was being spent" were people who didn't own much property and who didn't care about taxes.

The subject was asked to use only the data given and to assume that the data are true. The total number of items in the entire test was 20 and the total possible score was 69.

Data relative to the subject's behavior in free choice situations were obtained in two ways. Ten situations were devised in which the subject performed some activity involving a choice. These were arranged in pairs so that five could be given in one examining period and five in another. The use of two approximately equivalent examining periods spaced about one week apart made possible a study of the reliability of the behavior scores.

In addition to the ten items on which data were obtained by direct observation, eight situations were selected from the range of activities of ordinary adolescents and data as to each subject's performance obtained by interview with the subject. These eight were also arranged in two groups of four, each group given in one examining period. Each behavior item was scored as 1, 1.5, or 0 depending upon whether critical or uncritical approaches were used. The total possible behavior score was eighteen.

In four of the ten situations involving direct observation of behavior the subject was presented with an illusion and was asked to make certain estimates. A small and convenient measuring instrument lay on the table in full view of the subject so that he could make measurements if he so desired. In another four of the ten items the subject was presented with a simple question involving some interesting and important relationship in the area of human development. An example is the item concerning the effect of smoking on body health and growth. The subject was asked to describe what the effect is. It was indicated to him that he could take plenty of time if he wished to frame his answer. The idea was to help the subject to do what he deemed necessary. The experimenter was prepared to grant time for looking up material if the subject so desired. If the subject gave a very critical answer supported by data or indicated the kind of data he would like to have he was given a score of 1. If he answered uncritically and without qualifying his response he was given a score of 0.

In two of the ten items involving direct observation of behavior the subject was given a simple problem requiring simple but critical analysis. If he analyzed the situation critically he was given a score of 1; if he analyzed it uncritically he was given a score of 0.

The eight situations in which a description of the subject's past performance was obtained included two items in which the subject was questioned as to articles he had recently purchased. After he had named the articles he was asked how he happened to choose the particular brand he finally selected. If he used carefully tested data or proceeded cri-

tically he was given a score of 1; if he proceeded without careful data he was given a score of 0. Two items relative to the choice of books, magazine articles, or comics recently read; two items relative to the choice of motion pictures recently seen; and two relative to the use of radio programs were also included. The scoring in each case was the same as in the purchasing items.

To study factors that may affect the relationship between ability and behavior, data were obtained relative to evidences of conflict as measured by the Luria test, interests as measured by selected sections of the Sheviakov and Friedberg Interest Inventory (2), and the nature of the subject's hierarchy of wants as obtained through interview using an adaptation of questions suggested by Vernon (3).

Results. Reliability of tests.—The first item of interest is the reliability of thinking tests and the behavior scores. The odd-even correlation on the thinking test is .76 which by the use of Spearman-Brown formula becomes .86.

The reliability of the behavior scores was tested in two ways. Since the behavior situations were divided into two groups it was possible to compare the scores obtained in the two examining periods. Since the number of categories in which the scores can be classified is at most eight and since the scores on the whole were much lower than this it was not possible to use the product moment correlation. It is possible, however, to set up two distributions and apply X^2 to these distributions. The distribution are as follows:

Score	1st half	2nd half
0	0	6
1	11	11
2	8	2
3	4	4

X^2 equals 9.6. With three degrees of freedom, X^2 must equal 11.341 to be significant at the one per cent level. In other words, it cannot be said at the one per cent level of confidence that the two distributions are different.

A test was also made of the reliability of the scoring of the behavior data by having two independent observers score the data from 13 examination periods selected at random. The agreement between the two observers was complete in nine of the thirteen cases and differed by but one step in the remaining four.

Relation of Scores.—One of the first relations to be studied is that of total thinking scores to total behavior scores. The two tend to be associated as indicated by a correlation of .31, but the association is relatively low. It becomes most interesting, therefore, to inquire into factors that affect the relationship.

Before we proceed to discuss the relation in detail it is interesting to note that even those subjects making high scores in the test of thinking ability achieved relatively low scores in the behavior situations. The total possible score on the thinking ability test was 69. The two highest scores were 57 and 43 respectively. The highest score in the behavior situations was 6.5 or slightly more than one third of the total possible score of 18.

Another way of expressing the same result is in terms of the items passed and failed in the behavior situations. The subject achieving 83% of the total score of the thinking test, in other words, demonstrating a high degree of thinking ability, showed relatively little care in the selection of reading materials, motion pictures or radio programs, was willing to have her answers to the questions on the effect of smoking, effect of brushing teeth, and relation of brightness or dullness to physical development rest on practically unsupported claims. She did exert some care in making recent purchases but this care was not extended consistently to the other behavior situations.

The subject achieving the second highest score on the thinking test also did not carry through consistently on many of the behavior situations. He was willing to base his claims on the questions relative to health and development on unsupported data, exercised but little care in selection of motion pictures and reading material and exercised care in the purchase of but one of the two articles described in the course of the interview.

In order to study some of the factors affecting the relationship between ability scores and behavior the Luria test scores, the nature and number of the subject's likes, dislikes and indifferents as determined by the interest inventory and the nature of the individual's hierarchy of wants were examined. The outstanding difference between the subjects located to the extreme left and the subjects located to the extreme right of the regression line for the means of the behavior scores appeared to lie in the presence or absence of a

well formed purpose which was the subject's own and which he was attempting to carry out. The presence of a challenging plan seemed to be coupled with an appreciation that careful work is important. There were no distinct differences in emotional conflict and few distinct differences in the nature of the interests.

This general finding is substantiated by the following cases all located at the periphery of the distribution. Subject "A," for example, scored above the mean in the thinking test but achieved one of the lowest scores in the behavior test. An analysis of the interview and test data tends to indicate that this subject may be characterized as one who is "drifting" or following a "line of least resistance." In answer to questions as to the kind of person she wished to be, what she would like to do upon leaving school, etc. "A" said that she liked children and liked school and perhaps she would like to be a teacher but would give no qualifications of the kind of teacher she wished to be. Her favorite subject was mathematics but even in this she preferred teachers who above all did not give assignments that were too hard. Softball was her favorite game because "it was not as hard to understand." In the analysis of interest scores she had the highest number of indifferent responses. It seemed to the investigators that "A" had no genuine plan in which she was interested and which challenged her.

A similar picture is presented by subject "F" who scored near the mean of the ability test yet achieved a low score in the behavior situations. This subject gave inconsistent answers to questions relative to what kind of work he wished to do, what kind of person he wished to become, and kinds of teachers he admired. Again the investigator gained the impression of a lack of a well-formed plan toward which this adolescent boy was working. Without a challenging plan, how one works makes little difference.

On the other hand individual "C" achieved a low score on the thinking test but a high score in the behavior situations. This subject felt that it was important to have a goal and to try to reach it. He was actively laying his plans for two or three lines of work in which he wished to engage. In contrast to "A" and "F", "C" seemed to have a more clearly formed active plan that challenged him.

Similarly, subject "D" who achieved slightly above the mean on the thinking test yet attained one of the highest scores in the behavior situations. "D" was very careful throughout the interview to give reasons for her actions and semed to think that to have reasons for one's acts is important. She wished to become a stenographer and she supported her choice by giving her assets and liabilities.

Subject "E" scored above the mean on the thinking ability test and achieved one of the highest scores in the behavior situations. This subject, too, gave the impression of having a purpose and feeling that careful plans to achieve it are important. She volunteered that she intended to do work in science and referred to geology as an occupation.

Another comparison between subjects who achieved lower scores in the behavior situations (than would be predicted from the general trend of the group) with subjects achieving higher scores may be made by examining the purpose scores of all subjects. An approximate rating in terms of three steps labeled 0, 1, and 2 and varying from indifference to concern with an active plan was devised. A scatter diagram of all subjects was made and the purpose scores for each subject indicated. It was found that all individuals receiving scores of one or two were located on the right-hand side of the regression line, i.e., their behavior scores tend to be greater in relation to thinking scores than would be expected from the general trend of the group. On the other hand, individuals falling on the left-hand side of the regression line achieved zero scores in this approximate rating.

There may be other factors that affect the relation of behavior scores to thinking scores. Similar studies must be made with additional groups using more and different tests to obtain a comprehensive picture of the factors that may operate. However, the data of this study tend to indicate that one of the factors affecting the relation is the relative presence or absence of a well-formed plan and an appreciation of careful work in realizing the goal. This would tend to indicate that if we wish to guide adolescents in the use of scientific thinking when they are on their own, attention must be directed to both the ability and a stimulus to the use of that ability. Such a stimulus in this study appeared in those subjects who had a rather definite goal toward which they were working. It seemed that in their attempts to attain their goal they

had learned something of the importance of logical or scientific procedures and this appreciation of the importance of the scientific approach tended to stimulate them to use it when they were free to make choices.

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